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A Context Based Tracking for Similar and Deformable Objects

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ABSTRACT

Object detection and tracking is the most basic and important process to understand video content. Due to its numerous applications, it has attracted many researchers to the field. Lots of work has been done in tracking; however, tracking of a deformable object is still in its initial stage. Most of the start-of-art methods fail to handle rapid variations in an object's shape and size. The task becomes even more difficult when there is multi-target tracking. In this article, the authors have proposed a novel tracking method based on context (spatio-temporal) formed from the corner points of object regions. The correlation between the targets and background based on context is used for tracking. The proposed method is successful in tracking objects that are changing their appearance (shape and size) frequently and are having near similar appearance.

KEYWORDS

Automatic Segmentation, Context Tracking, Object Tracking, Spatio-Temporal Context

INTRODUCTION

In recent years, there has been an exponential increase in the number of the videos recorded and shared over the internet. Consequently, the demand of analyzing and understanding videos automatically has also increased. Object tracking is a hard problem as many different and varying circumstances need to be included in one algorithm (Yilmaz et al., 2006). There is a plethora of work done in tracking of rigid objects like vehicles, ball, etc., under varying conditions but tracking of non-rigid objects is still a challenging task (Jalal and Singh, 2012). Fast tracking of deformable objects is necessary to handle flexible objects like rope, cloth, paper, human cell, sponge, and living creature. The tracking of deformable objects is useful in medical imaging, robotics, motion-based recognition, video indexing, etc. Tracking of such kind of objects can help us to train robot to clean the room, make us breakfast or help us in surgical operation. In spite of having broad range of applications, tracking large number of deformable objects simultaneously is very challenging, as target identity may be lost by the tracker (Chu and Smuelders, 2010).

The tracking of multiple moving objects has attracted large number of researchers to do research in this area of computer vision because of it large range of applications, to improve the quality of

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A measure of Temporal Contextual Information on Trust based Recommender Systems

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Abstract - **In an era of information age, recommender system helps users to make an effective decision. Collaborative filtering is one of the techniques to provide a personalized recommendation to users. Collaborative filtering based recommender technique provides the recommendation by aggregating ratings from similar users to predict ratings for an active user (who wants a recommendation). The similarity has a greater impact because it acts as a criterion to identify a group of similar users whose ratings will be merged to generate a recommendation for the new item for an active user. However, there are a lot of issues in Collaborative filtering for e.g. data sparsity and cold start, which can be removed by incorporating trust information. We propose a methodology to include temporal context information in providing accurate rating prediction along with Trust matrix and also propose a framework to analyze the performance of Trust-based recommender algorithms on Film Trust dataset which includes temporal context information.**

Keywords: Collaborative filtering, Recommender Systems.

1. INTRODUCTION

Recommender Systems is considered as an application of Machine learning and Big data. Collaborative filtering is one of the most prominent techniques in recommender systems. According to Collaborative filtering users having similar taste in the past are likely to favor the same items in future. Rating information are very sparse in nature. Including trust value in recommender systems gives a direction to provide users with recommendation which is based on past behavior and social trust values. It is

noticed that people get influenced easily by what their friends recommend. The approaches for Collaborative filtering are classified into two categories [1] [2].

I. Memory based Approaches: Algorithms based on it try to find similar users by looking into an entire user space which is not good in practice as well as time taking activity. Every user is considered as a part of a group of people having same interest. These Algorithms compute user Similarity using PCC.

II. Model based Approaches: It gives an approach for the system to learn from training data, and then make intelligent predictions for the test data. Usually SVD method and regression models can be used for numerical ratings[6][8].

Merging trust in Recommender Algorithm remove two drawbacks of Collaborative filtering [1] [2] [4].

I. Rating metrics are sparse means that very few ratings are available. Also Data sparsity means that there is a problem in finding similar users whose past behavior is same as an active user.

II. Cold start deals with a problem of generating accurate recommendation to those users who are inactive in system or those users who generally rate less than 4 or 5 items.

There are two ways of including trust in Recommender System is achieved by two ways: first is explicit trust (values specified by users) and second is the trust value calculated implicitly or called Implicit Trust[7][9]. Explicit trust means that the trust information is explicitly provided by users. However, several points have been taken into consideration for explicit trust. One of the issue is trust values can be specific in many system and second issue is that trust values can generate inaccurate results[11][13] For example two friends having good trust values can have different taste for a particular movie.

Similarity computation to compute similar users have significant influence on the performance of Collaborative filtering. It is applied in both memory-based and model-based approaches [14]. The methods adopted for calculating user similarity in Collaborative filtering are Cosine similarity (COS) and Pearson correlation coefficient. Cosine similarity (COS) defines similarity between two users as cosine value of the angle between

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A model-based scheduling approach for selection of Real-Time Scheduling Algorithm on basis of Different Parameters

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Abstract - **In Modern days, the real-time system plays an important role in our modern and digital society. The success of any real-time application is totally depends upon the selection of optimal scheduling algorithm. In real time application, every task should have the nature of deadlines and time when they arrived, on the basis of these parameters we observe the response time of different scheduling algorithm then we select the optimal algorithm for a particular application. So in this paper, our aim is to reduce the complexity of real-time system researcher for selection of scheduling algorithm for a particular application. This model-based approach is an extent the state of any real-time system in the area of scheduling. This approach works in any uniprocessor system.**

Keywords: Hard RTS, Deadline, WCET.

I. INTRODUCTION & MOTIVATION

The real time system is much different to non-real time system. They perform and gives result within a certain duration of time. In real time application they monitor and controls the process and must react to change in timely fashion, sometimes in milliseconds. In Hard Real time system, a sophisticated coordination is required and timely responses to the events is a challenge, so for scheduling of any real time application is required optimal scheduling algorithm. This motivates the study and evaluation of different real time algorithm and choose the optimal algorithm for a time critical task because failure to lead the loss of life and properties.

For any RTS, the major issue is scheduling algorithm. There are many types of scheduling algorithm exists due to various needs and requirements of real time applications [5]. The selection of scheduling algorithm having very importance in any real time application and greatly influenced the algorithm will serve what kind of system. In this research article we present a model based approach that can be very helpful to the real time system researcher for selection of optimal algorithm for a particular real time application [8].

The two important characteristics of any real time application is time of completion of task and when they arrived. The tasks arrivals may be periodic with constant intervals and may be aperiodic with random in nature. [12] So that the important factor is a time constraint task should be completed within their time interval and did not miss their deadlines. The task having hard deadline must be executed and gives result with in their specified time period and never miss their deadline.

In different real time application, the nature of deadline may be differing and if any task misses their deadline, the significance of execution for such a task is nil. If any hard deadline missed, that causes the failure of system. Missing deadline is major factor for any hard real time system so that the chosen of scheduling algorithms for a particular task set is playing a very vital role to successfully completion of task set and gives their specified result in a given period of time, so in this paper we are having much more concern with timing requirement in hard real time system [14].
Any real time task set using some terminology to better understand and carried out.

Release Time: Time required to any task to be ready to release
Deadline: The finishing time of any task
Slack: Time available for maximum delay of any task

WCET: The time period required to complete any task successfully and in critical condition.

Run Time: Require time for completion of task
Hard Real Time System: Deadline (Time Constraint) should not be changed in any condition

Periodic Task: Task should have arrived after fixed time interval

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A Novel Approach for Regression Testing of Web Applications

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Abstract—Software testing is one of the most arduous and challenging phase which is to be implemented with the intention of finding faults with the execution of minimum number of test cases to increase the overall quality of the product at the time of delivery or during maintenance phase. With the ever increasing demand of web applications and to meet never ending customer expectations, updations are to incorporate which will be validated through testing process. The structure of the web applications (dynamic website) can be modeled using weighted directed graph which consists of numerous paths starting from homepage (index page) of the website. For thorough testing of the website each and every path of the graph should be tested but due to various constraints like time, money and human resources it becomes very much impractical. This scenario ultimately gives rise to the motivation for the development of technique which reduces the number of paths to be tested so that tester community can test only these numbers of path instead of all possible paths so that satisfactory number of faults can be exposed.

In this proposed approach assignment of weights on the edges of the directed graph takes place on the basis of the organization of the website, changes in the structure of the website at page level, experience of the coder and the behaviour of the users who have visited the website earlier. The most fault prone paths are identified using random, greedy, Ant Colony Optimization (ACO) and Artificial Bee Colony Optimization (ABCO) algorithms. Two small size websites and one company's website, and their two versions, were considered for experimentation. Results obtained through ACO and ABCO are promising in nature. This approach will support testing process to be completed in time and delivery of the updated version within given hard deadlines.

Index Terms—Artificial Bee Colony Algorithm, Ant Colony Algorithm, User Session based web testing, Web Application Testing, Test case Reduction and Regression Testing.

I. Introduction

In today's E-Commerce oriented state of affairs, web technology and its applications are playing very vast role. E-Commerce is mostly governed by the web applications which are based on different web technologies and hosted over the web servers so that user can access them over intranet or internet through web browser.

The structure of the web applications is complex and changeable in nature. Due to recurrent updates web application testing is required without interrupting the provided services. To achieve endless user expectations and sustainability in highly competitive environment, there is always a need of modernized, reliable and quality web application. Some published literature revealed that non availability of the renowned E-Commerce websites even for a short span of time results in huge losses for the company. Web application testing is executed with the objective of finding fault(s) at various levels (page, module or functionality) of the web application. Various web application testing strategies have been evolved but testing all of the web pages with every possible request (test data) i.e. thorough testing without interrupting the services is an exigent assignment due to constraints like monetary issues, short span of time and availability of skilled human resources.

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A Novel Framework for Sentiment and Emoticon-Based Clustering and Indexing of Tweets

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Abstract. Social Networks have become an important part of people's life as they share their day-to-day happenings, portray their opinions on various topics or find out information related to their queries. Due to the overwhelming volume of tweets generated on a daily basis, it is not possible to read all the tweets and differentiate the tweets based on the views or the attitude they portray only. The primary objective of sentiment analysis is to find out the attitude/emotion/opinion/sentiment that is present in the material provided. Commonly, the tweets can be clustered on the basis of them being positive or negative i.e. being in favour of the topic or being against the topic. The clustering and indexing of the tweets help in the organisation, searching, and summarisation of task. Twitter data are considered as Big Data and the information contained within the tweets is unstructured and if utilised properly can be very useful for educational and governance purposes. In this paper, a method is presented which clusters and then indexes the tweets on the basis of the sentiments and emoticons that are present in the tweet.

Keywords: Twitter; sentiment analysis; tweet clustering; tweet indexing.

1. Introduction

Since the launch of social networking sites, people are continuously spending more and more time posting and surfing on various sites and even rely on them to get information about their current day-to-day happenings. The data contained in the Twitter database is too vast and is considered as Big Data. Thus, it is a challenge to extract information from such a vast amount of data as it is equivalent to finding a needle in a haystack, as one does not know where to look. One can follow the Query Intensive Interface Information Extraction (QIIIE) approach as proposed by Sharma and Sharma (2011). Singh and Sharma (2013a) stated that due to the dynamic nature of the web and trending topics, the tweets related to certain topics may vary in frequency. Singh and Sharma (2013b) stated that one can retrieve tweets that are based on a particular topic in question, but there has to be some sort of relevancy attached to it. A single tweet is fairly disorganised and it is disorienting to obtain information from the tweet. Hoang *et al.* (2008) stated that the efficiency of the

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A Novel Text Detection Technique Based On Corner Response

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Abstract - **Data about the text incorporated in pictures and videos have a cardinal role in semantic assessments. In this paper, Novel text Detection and Localization (NTDL) algorithm is presented for text detection and localization in the background that incorporates noise in it. This algorithm is constituted by corner response. In contrast to the portions that do not contain text, there are some edges that are dense and corners in portions having text. So, some related strong reactions from regions of text and minimal reactions from portions that do not have text. These reactions furnish some cues that are highly useful for text detection and localization of pictures. By employing a basic schema constituted on the threshold, we obtain regions of candidates for text. These portions are evaluated by interlinking several characteristics like size and color of linked devices. Lastly, the text line is identified exactly by the projection of response from corners. The outcomes from illustrations present exactness speed and recalling for suggested methodology and we have obtained the recall of 93.25%, accuracy 97.96% and speed of 98.14% that greatly enhanced the performance of the system.**

Keywords: Edge detection; corner detection; connected component; textual approach.

I. INTRODUCTION

Text detection in pictures and videos has gained attention of various explorers from past few years. Texts are the source to furnish cardinal and instinctive data and they have a close relation to videos. Thus, it is very simple and easy to evaluate the logics of videos related to the data accumulated in texts. But this can be achieved if detection of text is done efficiently and inaccurate manner.

According to the survey of digital media it has been found that the extracted information can be used in a wide range of applications like Content based Image Retrieval System and Reading Foreign Language Text etc. Basically, the images are divided into three main categories: Scene images, document images, and born-digital images [1]. Scene images contain the text, such as advertising boards, banners, which is captured naturally when the scene images are taken by the camera, therefore scene text is embedded in the background as a part of the scene. Document images are the image format of the document. Born-digital images are generated by computer software and are saved as digital images. Compared with document images and scene images, there are more defects in born-digital images, such as more complex background, low resolution, compression loss. So, during the text extraction from born-digital images, it is very difficult to differentiate text from the background. Now if we talk about the text that appears on an image, then it is classified into two parts- Scene Text and Artificial Text [2]. Scene Text is a part of an image while Artificial Text is produced separately and laid over the image. Both the categories have their own methods of detecting text [3].

This paper is organized as follows: In section II, theoretical aspects of the existing work are described. The proposed work is explained in section III. Section IV discuss and compare the various experimental results and conclusion and future work are discussed in section V.

II. THEORETICAL ASPECTS

A. Existing Work

In the previous work text detection is divided into 3 sub-parts: First, technique constituted on interlinked devices estimate some confinements on sections containing text like consistent colors, defined sizes and alignments in space are taken into account. By linking the characteristics of size and color, Yu and Jain et al [4] detects the color as interlinked devices in frames of videos. The main issue we deal with this situation is that it is not generally incurred for every kind of picture. Assize, shape and color in a text may vary from pictures; Secondly, methodologies constituted on texture or edges [5] assume that there is smoothness in backgrounds than in portions of texts. So, one is able to distinguish between portions that have text and the portions that do not have as per the intensity of texture and edges. But the deduction of noise from complicated backgrounds is an issue which we still face.

A technique is suggested by Lyu et al [6] to identify texts that are in multiple language and resolution. Maps on the edges of Sobel are taken as characteristics and a defined particular threshold is opted to discover the text's candidate area. Techniques constituted on main moments of blocks of pictures are suggested by Li et al [7] they revealed that text

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A Review on Image Forgery Detection Techniques on Passive attacks

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Abstract - **In the today's era, nearly all of us rely on the images of the memories of our lives and loved ones. The images are useful in proving anything in the court of law by showing them as an evidence of the event, getting insurance of a mishappening, getting appreciation, or for conveying personal lifestyle to their friends through social media. However, various Image editing tools like Adobe Photoshop, Picasa, and Lightroom, etc. can produce forged images, thus changing the perspective of the viewer about the event. Image Forgery has become much prominent nowadays and is being done either for fun or for an intention. Many researchers have worked in finding techniques that can classify the forged and authentic images. This objective of this paper is to provide a glimpse of work done so far in the field of Image Forgery detection.**

Keywords— Image Forensics, Image Forgery Detection Techniques, Passive Techniques, Blind Techniques.

I. INTRODUCTION

The technology has seen a progressive path of the various image and video editing tools and advancement of digital camera that has made the people doubt the authenticity of the digital images. The art of forging an image is not a new act [1]. However, in the current digital world, it is possible to create, alter and modify the content of image or video very quickly without leaving any noticeable traces of these tampering operations [1] [2]. However, due to the usefulness of the digital images in the court of law and for showing as an evidence of an event that happened in the past, the need for automatic forensic algorithms has arisen in order to find the trustworthiness of the image or the video shown for a specific purpose [3].

A. Attacks in Image Tampering

The tampering done on an original image, thus, producing a false image showing different perspective is termed as Image Forgery. According to Farid [2], the image forgery can be categorized into three major categories:

•Cloning or Copy Move: One of the most prominently used tampering attacks is Copy move. In this, the attacker performs cloning or Copy-move on an image to hide or reveal any or some part of an image. Copy move Forgery, done with an intention, is near to impossible to detect through the naked eye. However, it can be verified through some algorithms as the original pixel alignment is altered in the tampered image and can be used as a hint to identify a forgery in the image.

•Splicing: When an image is created by combining two or multiple images thus producing an image [4] the attacker wants to show to the users to change their perspective about the scene, the forgery is classified as splicing. However, though difficult to identify splicing visually, it can be identified by various factors such as the difference in noise levels, or the difference in the number of compressions in different parts of the image, etc. to name a few.

•Re-sampling: Re-sampling in an image refers to resizing, stretching, or rotation done in an image or a part of an image in order to produce a composite image having similar features. This can be used to show something that really does not exist such as person holding a pet of enormous size though the pet originally would have been comparatively smaller.

(a)

(b)

(c)

(d)

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An Efficient Steganographic Approach for H.264/AVC Compressed Videos

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***Abstract* - Steganography is the art and science of communication which hides the presence of secret information. In this paper, a novel approach to hide the secret information in videos has been proposed for H.264/AVC compressed videos. H.264/AVC is known to be highly efficient and network friendly coding technique. In the proposed approach, we have utilized the F5 algorithm for preventing statistical attacks and improving embedding efficiency. Perceptual quality has been taken into consideration while using the Steganographic technique as well as after the compression by the H.264 method. Firstly, the videos are compressed and then the Steganographic method is applied. From the results, it is evident that F5 method gives the better PSNR values as far as perceptual quality is concerned.**

Keywords— Steganography, H.264/AVC, PSNR, Perceptual Quality, F5.

I. INTRODUCTION

Data hiding deals with the ability of embedding data into a digital cover with a minimum amount of perceivable degradation which makes the hidden data invisible to a human observer [1]. Due to all these facilities Steganography have thrilled the digital era. Many interesting Steganographic techniques have been created and its continuing evolution is guaranteed by a growing need for information security. There are several requirements in steganography, including the high payload of hidden information, imperceptible distortion, security and reliability [1]. To achieve the practical covert communication, digital video files can serve as good hosts, especially when these files are available to most of the people and their transmission is increasingly popular.

H.264/Advanced Video Coding (AVC) is the state-of-the-art video codec and its decent coding performance lends itself to become the major coding mechanism in various applications [2]. The most popular digital video formats/containers for file sharing nowadays, including FLV (Flash Video), MKV (Matroska Multimedia Container), AVI (Audio Video Interleave) and MP4, etc., support H.264/AVC so we choose the video files employing H.264/AVC as the "stego" host. First, a user may acquire a video file compressed by a popular video codec, such as MPEG2 or MPEG4, and will use this video content as the stego host. The stego video will then be transmitted to the trusted party and the hidden information should be extracted efficiently and reliably from the partially decoded bit-stream.

In [1] the author has proposed the modern research work in the area of Steganography technique deployed in transform, spatial, and compression domains of digital images. Transform domain techniques alters the frequency coefficients instead of manipulating directly the image pixels, thus keeping distortion at minimum level and that is what makes them preferred over spatial domain techniques. But in case of embedding capacity, spatial domain techniques have proved to give better results.

In [2] author has implemented Steganography in Multi Media Services (MMS) using image over mobile communication. It is secure because data which needs to be hidden is encrypted first and then embed in to message in both image and text as well [2].

In [3] the author has discussed Steganography and its types. They laid due emphasis on Line and Word Shift Coding, Feature Coding techniques as different methods of it. In [4] the author introduced a new Steganography technique to provide better protection to digital data content. They did a comparative study of the current literature in digital audio Steganography techniques and also discussed its strengths and weaknesses. In general, the temporal domain techniques, aim to maximize the hiding capacity, transform domain methods by exploiting the masking properties in order to make the noise generated by embedded data indiscernible. On the other hand, encoded domain methods endeavor to ensure the veracity of hidden data against challenging environment, such as the real time applications. To better approximate the sturdiness of the presented techniques, a classification based on their occurrence in the voice

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An Image Forgery Detection Approach Based on Camera's Intrinsic Noise Properties

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ABSTRACT

Digital images are found everywhere from cell phones to the pages of online news sites. With the rapid growth of the Internet and the popularity of digital image capturing devices, images have become major source of information. Now-a-days fudge of images has become easy due to powerful advanced photo-editing software and high-resolution cameras. In this article, the authors present a method for detecting forgery, which is detected by estimating camera's intrinsic noise properties. Differences in noise parameters of the image are used as evidence of Image tampering. The method works in two steps. In the first step, the given image is classified as forge or non-forge. In the second step, the forged region in the image is detected. Results show that the proposed method outperforms the previous methods and shows a detection accuracy of 85.76%.

KEYWORDS

Camera's Intrinsic Noise, Forgery, Kurtosis Concentration, Noise Parameters

1. INTRODUCTION

In the past decade, digital images have evolved to become an essential part of our life from entertainment to mass media, from medical diagnosis to criminal justice, and even in national security. However, the increasing sophistication of advanced photo-editing software (e.g. Adobe Photoshop, Corel Draw etc.), help the people to forge images easily.

These editing methods result in manipulated images with no obvious traces of these operations. For the detection of these manipulations, the techniques are widely known as image forgery detection techniques (Birajdar & Mankar, 2013). Image forgery detection deals with detection of the presence of manipulation in an image. Two kinds of detection techniques are possible: Active forgery detection and passive forgery detection. At the time of the birth of digital image forensics, active forgery detection methods such as digital watermarking and signature served as major solutions to protect the integrity of digital images. However, active methods require an authentication code to be embedded with the image.

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AODV with Reliable and Energy Efficient Route Maintenance Phase

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Abstract - **AODV is a much popular reactive protocol for Mobile Ad hoc Network. But the performance of AODV is comparable in the highly mobile network due to frequent route breaks. In this paper, we proposed a modified AODV protocol with reliable and energy efficient route maintenance phase. So that in case of link failure a reliable and energy efficient backup route is selected for data packet transmission. It overall increases the packet delivery ration in a highly mobile network as well as increase the throughput and network lifetime. We simulate our proposal on discrete network simulator NS2. The result shows that our proposed approach improves the performance of AODV in terms of packet delivery ratio and network lifetime. Our approach also provides the good QoS parameters when primary route fails.**

Keywords: Ad-hoc networks; AODV; Route Discovery; Route Maintenance; Reverse route; Network lifetime.

I. INTRODUCTION

A Mobile Ad-hoc Network (MANET) is a multi-hop network with dynamic topology. In MANET all nodes are self-organize to setup a network. Due to mobility of nodes routing is very challenging task in MANET. Many conventions routing mechanism are utilized for correspondence in MANET. Some of them are proactive (table driven) and some are responsive (on request). The Ad hoc On demand Distance Vector (AODV) [1] is considered most well-known on demand routing mechanism in MANET.

AODV setup the route by broadcasting the route request RREQ packets to all nearer nodes to find the path to destination. After receiving the request packet node check the table entry for the route if route is found the route reply message send to the source, otherwise request forward to nearer nodes in the vicinity. If the node gets the request is destination, send the route reply RRER message to the source using the reverse route from which the request may travel through the destination. After receiving route reply message from destination, the source node makes the entry in table and start to transmit data packets.

If a hop examinations break in path of a dynamic route, it drops the packets and erases every one of the entry concerning way close by this broken connection from the entry table and, communicate route error message to illuminate upstream hops to erase the relating sections from their table. Source hop get hold of route error message, it erases the route and also discover the new path by means of flooding route request. It might be expensive to drop information packets at moderate hops. What's more, visit route discovery may likewise development the conflict and overheads.

The goal of this paper is to upgrade the route maintenance of unique AODV convention by considering more reliable hops as secondary hops at the time of essential route inability to diminish the likelihood of incessant connection breaks and furthermore enhance the network life time by utilizing a backup route of action which has all the more outstanding energy efficiency. Because of modified approach, if route breaks between two hops then upstream hop can utilize the secondary route other than the dropping of information packet. The rest of this paper is sorted out as takes after: Section II examines some related works. Segment III talks about proposed plans. Area IV exhibits the simulation result comes about. At last, in segment V, conclusion and future bearing are introduced.

II. RELATED WORK

Reliable delivery of packets is a most critical issue in Mobile Ad hoc Network. Because of high portability rate of mobility and different difficulties regarding reliable data delivery is as yet hot region of research in MANET. Some of researchers have proposed plans to improve the throughput and reliable data delivery in AODV. A scheme is proposed by Ngo Hoai Phong and Myung-Kyun Kim as AODV-ER [3]. This scheme is utilizing reliable route hop by hop to achieve high packet delivery

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Automated sub-retinal fluid detection comprising RPE-region using neighbouring pixel connectivity paradigm.

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Abstract

Sub-Retinal Fluid (SRF), a categorized retinal fluid accumulation just above the Inner Hyper-Reflective Layer (HRL) of the RPE-Region has a significant correlation with visual acuity. Sub-Retinal Fluid are the indicators of Macular Hole (MH) formations. Early information regarding SRF may help in tackling the chronic cases, as surgery is the only option for treating MH. Proposed is a method to identify Retinal Pigment Epithelium (RPE) region in Optical Coherence Tomography (OCT) visualization of the retina, further based on it the retinal pathology called as Sub-Retinal Fluid is detected. This paper discusses the newly proposed method for the detection of RPE region, the non-separated region between the inner and outer Hyper-Reflective Layer (HRL). To the best of our knowledge, identification of Sub-Retinal fluid, has never been automated. The work validation is done with the ground truths (manually delineated by an expert panel). Evaluation of the system (RPE-Region detection and SRF Detection) is done independently for both the proposed methods. RPE-region detection was done on 220 images from 23 patients at different orientation styles with 90.45% correct detections whereas the sensitivity and the specificity for the SRF detection is found to be 89.74% and 89.36% respectively over 164 images from 30 patients.

Keywords: Biomedical imaging, Computer aided diagnosis, Optical coherence tomography, Sub-retinal fluid, Retinal pigment epithelium.

Accepted on May 30, 2017

Introduction

Retina is the light sensitive, innermost layer of the eye. The eye focuses the image of the world on the retina, starting a series of chemical and electrical events within the retina. Retina then sends the electrical signals to the brain using the nerve fibers present in it. The brain interprets these signals as visual images [1,2]. The human retina has ten distinct layers. Over the years, retinal research has greatly benefited from advances in optical imaging techniques. Fundus imaging is a 2D imaging technique. The image captured by the fundus camera, used to visualize central and peripheral retina, optic disc and macula. Retinal Optical Coherence Tomography (OCT) is a 3D imaging technique. It is a low coherence interferometry to generate cross-sectional imagery of ocular tissues.

Cross-sectional visualization obtained by retinal OCT images are very useful for identification of abnormalities in the retinal layers and in the assessment of their severity. Retinal OCT imaging comprising, Optical Coherence Tomography, images the biological structures based on the light being reflected by the tissues without disturbing their histology and spatial positions. Reflected beam of light from tissues are collected and the delay in time of flight is calculated. This delay information helps to deduce the reflection surface's longitudinal location, the longitudinal scans known as A-scans. Number of A-scans are performed by the OCT scanner at different lateral positions to get the 2-D map of reflection, known as B-scan [3-13]. More the number of A-scans in a B-scan image, higher will be the image resolution.

Proposed Work

Accurate delineation of retinal layers in the OCT scans is an important step to identify the pathologies inflicting the retina. Delineation of inner Hyper-Reflective Layer (inner HRL) from RPE is difficult because backscattering signals are high in both these layers. Inner HRL is the junction between inner and outer photoreceptor segments while outer HRL is actually the retinal pigment epithelium (RPE) (probably with choriocapillaris). The first part of the work involves accurately identifying these two layers. Under normal conditions, water flows from the vitreous cavity to the choroid. If there is a decrease in the outflow or increase in the inflow of fluid that disturbs the normal compensatory mechanism, fluid starts accumulating between the retinal pigment epithelium and the choroid, known as Sub-Retinal Fluid (SRF). SRF can lead to a sight-threatening disease known as Retinal Detachment. Early detection can save the patient from many complications. The second part of this work involves automatic detection and

Computing
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Energy balanced data gathering approaches in wireless sensor networks using mixed-hop communication

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Abstract Wireless sensor networks (WSN) consists of small battery powered nodes. Energy efficiency and energy balancing are the most stringent needs of WSN for prolonging its lifetime. Due to many-to-one communication pattern in multi-hop communication, energy consumption is unbalanced in the network. Nodes which are closer to sink deplete their energy much faster than the nodes further away. This paper reviews and presents a comparative study of the various data gathering protocols that aim at balancing energy consumption using mixed/hybrid transmission schemes. It also highlights the aspects of the existing approaches that can be worked upon to achieve a more energy efficient and energy balanced data gathering approach in future.

Keywords Wireless sensor network · Routing · Energy-efficiency · Energy balanced routing · Energy balancing · Mixed hop transmission schemes · Hybrid transmission · Data gathering · Data propagation

Mathematics Subject Classification 90B15 · 60H30 · 60B11 · 60B05

1 Introduction

Wireless sensor networks (WSN) consist of very small, low-cost and low-power nodes. These nodes are capable of sensing various types of physical or environmental phenomenon like temperature, pressure, humidity, light, radiation, vibration, seismic

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HierarchicalRank: Webpage Rank Improvement Using HTML TagLevel Similarity

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Abstract: *In the past researches, two types of algorithms are introduced that are query dependent and query independent, works online or offline. PageRank Algorithm works offline independent to query while Hyperlink-Induced Topic Search (HITS) algorithm woks online dependent on query. One of the problems of these algorithms is that, division of the rank is based on number of inlinks, outlinks and different parameters used in hyperlink analysis which is dependent or independent to webpage content with the problem of topic drift. Previous researches were focused to solve this problem using the popularity of the outlink webpages. In this paper a novel algorithm for popularity measure is proposed based on similarity between query and Hierarchical text extracted from source and target webpage using Hyper Text Markup Language (HTML) tags importance parameter. In this paper, result of proposed method is compared with PageRank Algorithm and Topic Distillation with Query Dependent Link Connections and Page Characteristics results.*

Keywords: *Web mining, web graph, hyperlink analysis, connectivity, pagerank, HTML tags.*

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1. Introduction

With the growth of technology in the field of internet, number of web pages on World Wide Web (WWW) is increasing day by day. So, size of the information on WWW grows very rapidly. Thus the necessity of searching useful and required information comes into front. For this purpose, it is a need to mine required information from the internet, Web mining is used to retrieve the relative information from the internet. For this purpose, search engines are used that works as interface between user and WWW. Different search engines provide required information to the user based on different ranking algorithms. In the WWW large number of webpages are linked to each other directly or indirectly through hyperlinks and create a web graph [2, 7, 13, 18]. For retrieving information from the web three classes of Web mining are used that are:

1) Web Content Mining (WCM).
2) Web Structure Mining (WSM).
3) Web Usage Mining (WUM) [5].

WCM related to extracting the required content from the webpage. WSM is related to relationships among webpages and using linking information for webpage ranking through hyperlink analysis. WUM is used to extract the user's profile (for example number of clicks for a particular topic). These three mining techniques have been used by various researchers in their work such as WSM used in PageRank Algorithm [1] and Weighted PageRank Algorithm [20]. Combination of these techniques is used in various researches related to improvement in ranking. WSM is used with WUM in 'PageRanking based on number of visit of link of webpage' by Kumar *et al*. [10], 'Weighted PageRanking based visit of links' by Tyagi and Sharma [17] and 'An Improved Page Rank Algorithm Based on Optimized Normalization Technique' by Dubey and Roy [4]. Figure 1 shows the classification of the various research works based on different web mining techniques.

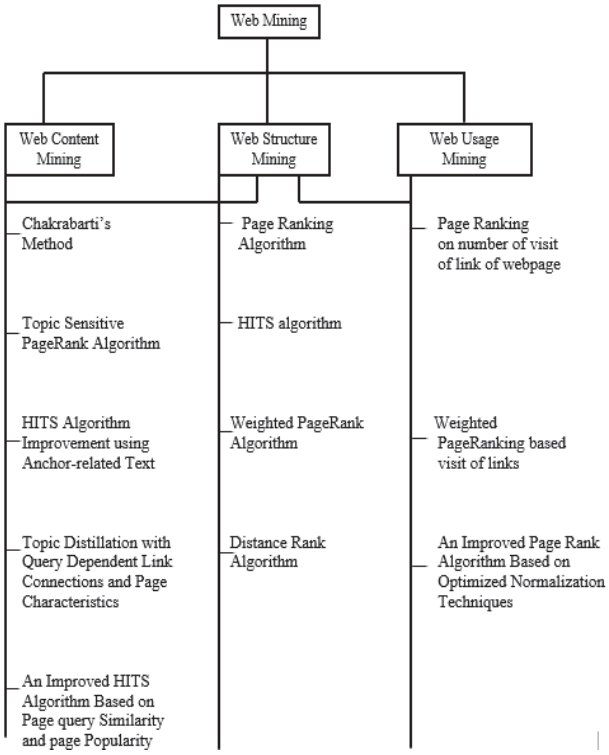

Figure 1. Classification of webpage ranking algorithms based on web mining techniques.

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Improved Real-Time Scheduling algorithm for mixed task Set with Constraint of Harvesting Energy

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Abstract - **In mobile system devices, every system must be having own resources for power and cannot depend on the power from the outside, apart from feasibly scheduled the task set, managing the power is the main concern for all type of real-time systems. The consumption of the energy depends upon the power management of the mobile devices. In this paper, we propose an extended and improved real-time scheduling algorithm for a mixed task set with the constraint of harvesting energy which has flexible speed assignment for a set of periodic and aperiodic tasks and ensures the feasibility schedule within their deadlines. This proposed article having some experimental results that show this algorithm is best for performance in terms of available energy after task execution, an average ratio of the task set at lower periodic load and deadline miss ratio.**

Index Terms — RTS, Embedded System, Harvesting energy, DVS, Mix Task Set.

I. INTRODUCTION

In every real time system all task should be completed within their deadlines and produce the correct result for an example anti-locking break system in a vehicle is a best example of hard real time system in this time computing system the real data is not produce expected result with in their deadlines it may cases system fail. Whatever real time system is there may be hard soft or firm is demand to achieve energy neutral operation if its execution requirement can be supported forever despite energy limitations [10].

In today's environment every devices executing on that platform which have their own battery power and needs real data with in a time period and also do not depend upon the power of outside because of the nature of mobility and most of the devices remains beyond the recharge point due to mobility, for example video streaming applications require light weight device that can be movable across the world [11].

So in this type of system those are always in mobility and not to be recharge every time because of unavailability of recharge point it require a strong power management system to enlarge the battery backup time period. However, in some application like wireless sensor node deployed in remote areas for environment surveillance, the replacement and recharging battery is not possible due to remote areas so such type of system also require harvesting energy for recharge their battery power and power management for battery to increase their life time. With the enhancement in the battery power the harvesting feature techniques is incorporated in battery [5]. Harvesting technique is very useful where the battery replacement or recharging is costlier. The harvesting energy is the process of producing electrical energy by using renewable energy resources available in environment. There is a lot of resources available in nature like solar energy, kinetic energy thermal energy etc. Therefore, the energy generated by such resources is sufficient for any battery operated system and there is no need of battery replacement, only requires best power management policies.

Characteristics of Harvesting Real Time Application:
The systems that have the ability to execute the task at lowest standby current to maximize the battery power storage, and in this system it also has the switch on-off ability instantly along with the analog capability for sensor communication and measurement. This system also has to operate on lowest voltage range to maximize the harvest power backup of the battery.
Harvesting Energy real time System Limitations:
1. Renewable energy resource is not available always it depends upon the nature.
2. Energy intensity varying and depends upon the nature of environment like in day time the intensity it too high and in night it may be zero in case of solar energy.
3. Energy storage must be limited and depends upon the battery capacity.

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Indeed A Big Technology: The Kernel methods

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***Abstract* - Presently there has been good interest in computing similarity for data mining and machine learning particularly. In this paper, we are discussing Kernel methods. Kernel methods are used pervasively mainly because of its large number of applications and scientific challenges. It has the capability to model real-world data and give efficient solutions to real-world problems. Such solutions given are one of its kind the most accurate and efficient as compared to the other existing ones. Along with the popular applications of kernel this paper mainly gives a basic understanding of fundamental aspects of kernel methods their underlying principles and formulas used. Various aspects of kernel approach are discussed. Some simulation results are shown in the discussed kernel methods and compared with new proposed kernel design.**

I. INTRODUCTION

Mostly real world data has no readily available representation as a single table or structured data. But present data mining methods mostly focused on single table. So to apply traditional data mining methods an extensive pre processing has to be performed. By that the computational cost and processing time has become a road block to effective data mining.

Hence all focus goes on a method which has less computational cost as well as easy to understand. Also results produced by the method should be interpretable. So here comes kernel trick or kernel method. A simple way of describing a kernel is a similarity function which is used in machine learning algorithm. Kernel may also be known as another name for the covariance function it takes set of input and find out how similar they are. As under some conditions every kernel function can be expressed as dot product in a feature space (mercer theorem) and many machine learning algorithms can be expressed in terms of dot products. The kernel method may be used for the different type of variables such as continuous variable, binary variable, nominal variable as well as ordinal variable.

Kernel methods have less computational cost because they can be applied in high dimensional feature spaces without having the high cost of computing to map data. They can easily do modeling of highly nonlinear data. Kernel methods have shown number of attractive features with empirical excellent performance. One of the strength of kernel methods is that they model non parametric modeling technique where it in not required to specify beforehand number of basic functions.

Kernel method algorithms are like the classical approaches with theoretical elegance that have closed form analytic solution with flexibility offered by modern nonlinear approaches. These methods have natural ability to deal with data that is not linearly separable and does not require user specific regularization parameter for penalizing misclassification. Kernel method is capable of handling very large datasets with modest computational load.

One of the critical parts of the kernel based learning algorithm is the choice of a best kernel method and the optimal parameters according to the data used. Kernel increases flexibility by increasing allowed similarity measures and make it possible to work with non vector form data [7][13]. Kernel methods when used with neural network leads to computational intelligence. Several international organizations, conferences and journals are dealing closely with this concept.

Overall the purpose of this paper is to show kernel trick, current scope from its past and present applications and uses while highlighting the answers of following:
•To illustrate basics of kernel methods so that one can understand them and apply as well.
•To know the computations achieved from usage of kernel trick.
•To know the evaluation and measurement methods such as standard or the popularly used ones.
•Study of simulation results of various existing kernel methods and a new proposed design.

This paper is organized as follows: In Section 2, the related work in area of kernel methods is discussed. Some popular applications and drawbacks of these methods are also presented. Section 3 presents the details of designing and choosing of kernel methods. In Section 4, the new proposed design for kernel method is discussed. Section 5 includes the discussion and experimental results details. Section 6 concludes the results obtained in comparison to

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SPECIAL ISSUE

Location estimation of non-geo-tagged tweets

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Abstract
Internet users are getting more and more dependent for information regarding their daily lives. Most of the users are connected to each other using social networks. Social networking sites not only helps the users to connect and talk to each other but also share information with each other. Twitter [1] users attach their location information with the post or tweet to show their presence at the location. But, not all users tags or integrate the location information within the post. If a person wants to obtain the latest updates about an event then he/she have to go through all the tweets about that event, which is impossible because nearly 500 million tweets are posted on Twitter on a daily basis. Using Twitter the users can post up to 140 characters in their posts or tweet. Also, the tweets that originate from the location of the event are latest and contain new facts and the rest of the tweets convey that information only. Non-geo-tagged tweets are eliminated by the traditional systems. This paper presents a method to tag the non-geo-tagged tweets with the location then the user would be able to obtain the latest information by including the new. The proposed method performs better than previous methods and yields better results.

Keywords Tweet · Twitter · Location estimation · Geo-tagging · Information retrieval

1 Introduction

Location is an important aspect when one has to find out the tweets from a specific region or characteristic. The location tags or geo-tags are present within a tweet when a user chooses to do so, otherwise it is 'nullable' in a tweet [2]. In summary generation tasks most of the tweets are left out due to the fact that they do not have geo-tags associated with them. The process of finding the geo-tags of tweets that do not have location information associated with them and providing them with an estimated location is called geo-tagging.

In 21st century, people have changed the way of traveling and gathering information. People rely more and more on online content for information. Before traveling to a certain location people want to gather information about the place, get to know the ambiance of the place, safety concerns of the place, important landmarks of the place, etc. When all this information was available on print media its reach was limited as only people having the physical copy of the document were able to gather the information. Times have changed and anyone with access to the internet can easily gather such information be it user-generated content in the form of micro-blogs or reviews. Also, since the rise of micro-blogs users have shifted their information need from print media to online media as micro-blogs require very less effort and time for development and can be deployed in extreme conditions as only a mobile device and connection to the internet is necessary for posting on micro-blogs. Nearly 500 million tweets are posted on a daily basis on Twitter [3] and not all posts contain geo-tags associated with them which makes searching of information quite difficult as without detailed analysis one cannot categorize the tweet's origin location.

A few informal communities have developed amid the most recent decade. Informal organizations, for example, Twitter, Facebook, and Google+ give clients the chance to convey what needs be and report insights about their regular social exercises. The blend of this conduct with the boundless utilization of portable advanced mobile phones and tablets prompted an exceptionally intriguing wonder, where the exercises revealed inside informal organizations are occurring progressively, with singular clients including reports from a few distinct areas (not simply from their homes, or work environments) [4].

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Machine Learning Based Approaches for Natural Language Processing

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Abstract - **Machine Learning can play a vital role in many applications such as data mining, natural language processing, image recognition and expert systems. In the development of natural language system, the corpus based machine learning techniques are widely applied. In this paper, machine learning methods such as classifiers, structured models and unsupervised learning methods are discussed that are applied to natural language processing tasks such as document classification, disambiguation, parsing ,tagging, extraction etc. This paper also covers different levels of linguistic analysis: Lexical Analysis, Parsing, Semantic Analysis, Part-of –Speech Tagging and Discourse Knowledge. The aim of this is to provide valuable information for further research.**

Index Terms — Machine Learning, Corpus, Tagging, Parsing, Discourse.

I. INTRODUCTION

Machine Learning is science that provides computers the ability to learn without being openly programmed. We use machine learning many times a day without knowing it. It brings together computer science and statistics to exploit the predictive power. On the other hand Natural Language Pro-cessing is a artificial intelligence method to communicate with computers using natural language. Speech and Text worked as an input and output of an Natural Language Pro-cessing System. We can broadly divide NLP system into two parts as Natural Language Understanding (NLU) and Natural Language Generation (NLG).NLU refers transforming a given input into some useful representation and also analyzes different aspects of lnguage.NLG refers to generate meaning-ful sentence structures in some natural language from some internal representation.

Most of the approaches that exist for NLP are mainly focused on machine learning that is a type artificial intelligence that examines and apply on patterns in data to develop a program's own understanding. In the early 90s, the application of machine learning techniques for natural language learning problems has drawn attention of NLP researchers. As a human being, we understand our natural language easily and really don't care about what actually understanding involves. Corpus-based language acquisition techniques that are used by NLP researchers are based on statistics and information theory. In this paper, we are discussing machine learning techniques that are applied to major NLP task such as POS Tagging, Parsing , Semantic analysis Word Sense Disambiguation, Text Categorization, Text Summarization and Information Extraction. Different linguistic levels that are applicable open to Machine Learning approaches are also covered in this paper; after that we explain the different types of machine learning approaches which are apply to natural language application tasks.

II. LEVELS OF LANGAUGE ANALYSIS

The following are different form of knowledge in relation with natural language understanding.

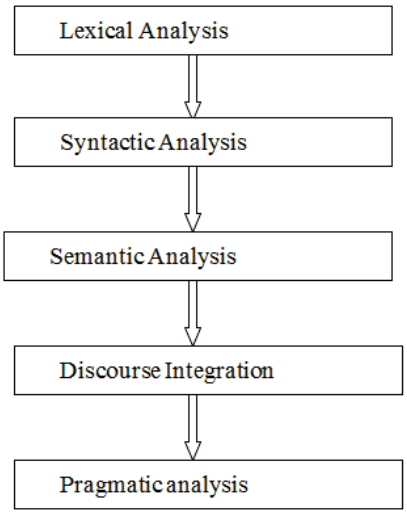

Fig.1 Linguistic levels

A. Lexical Analysis

A lexicon is a gathering of information about the words of a language and the lexical categories to which a word belongs. A lexicon is usually structured as a collection of lexical en-tries, like ("bank" N). Thus Lexical Analysis refers to identify and analyze structure of words. It is dividing whole text into paragraphs, sentences and words. A morphological analyzer identifies a word in a sentence

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Optimized Approach for Parallel OMR sheet Analysis

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***Abstract* - Recently there has been a considerable increase in the competitive examination and academic examination. Most of these examinations are using Optical Mark Recognition (OMR) sheet for filling the right choice of Objective type questions commonly known as Multiple Choice Questions (MCQs). In this examination process, every question consists of four different choices and the candidate has to mark the right choice. OMR system is used to avoid counting mistake and it reduces manual work of evaluation. In this paper, we are discussing different techniques used in OMR based evaluation. This paper proposes an efficient OMR evaluation technique to reduce the time of evaluation of OMR sheet. The main focus of the paper is on parallel processing in capturing the image and evaluation. The work is divided into two phases. First one is the processing phase in which OMR sheet is captured and data of every question is taken into matrix form. The second phase is the evaluation phase in which the result is calculated on multi-core processor architecture using the proposed algorithm. Also, comparative analysis of sequential and parallel OMR processing has been shown. It is expected to get optimized utilization of processors and processing time.**

***Keywords:* --- Grading system, parallel image processing, MCQ, OMR.**

I. INTRODUCTION

OMR Technology is the technique of gathering information from human by recognizing marks on paper. OMR sheets are still considered a reliable and effective method for collecting opinion or feedback during survey. A lot of competitive examination, colleges uses OMR sheets for tests and assessment. Even though online computer based assessment or surveys are more convenient but it is too expensive to be implemented. Multiple Choice Questions (MCQs) are popularly used as fast and reliable method for entrance examination all over the world. Several applications based on Optical Mark Recognition Technology has been developed to overcome manual grading solutions [3].

The scanning machine, referred to as OMR scanner, is used to read a large numbers of forms automatically. OMR machines uses sensor to detect student's response by determining whether the predefined position is blank or marked. The problem with OMR machine are its price and operating cost due to MCQ scoring papers which are more expensive than plain papers. To reduce the cost of OMR scanner machine, several image based OMR software systems have been developed.

Image-based OMR doesn't require costly hardware devices or special answer sheet. It also allows the user to design his special answer sheet using word processing software. The image based OMR depends on scanning the document. It uses different image processing and pattern recognition techniques to detect the class of the marked bubbles in the answer sheet.

Nowadays, Camera-based document analysis has received considerable attention due to the wide spread of advanced low priced digital camera [3] [4] [9]. The problems faced by camera based document analysis are illumination problems, zooming and focusing problems, low resolution, and perspective distortion, speed and accuracy in evaluation.

Multi-core processors enhance the performance of the system by concurrent execution of the allocated workload on different processors. There are many hardware architectures and software platforms that support parallel processing. The most common hardware architectures are FPGA, GPU, multi-core CPU, and DSP. For the software, many platforms that support developing parallel algorithms are used such as OpenMP, Intel TBB, Intel ArBB, and CUDA [4][10][11].The parallelism can be applied in image processing applications by three main ways: i)Data Parallel, ii) Task Parallel, and iii)Pipeline Parallel.

In this paper an algorithm for camera based OMR is presented with efficient and reliable performance. Parallel image processing has been used to utilize the parallelism of multi-core processors. The performance of proposed algorithm is beneficial in terms of reducing man power and time consumption.

The rest of the paper is organized as follows: section II summarizes the brief review of related work. In section III, the proposed algorithm is discussed. And section IV shows the results and finally ended with the conclusion of the work and future scope.

QoS-aware routing protocol using adaptive retransmission of distorted descriptions in MDC for MANETs

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Abstract: Quality of service (QoS) of delay sensitive application like video stream is majorly affected by instantaneous channel conditions over noisy mobile ad-hoc networks (MANETs). Methods like forward error correction (FEC) and automatic repeat request (ARQ), multiple description coding (MDC), and MDC with error correction (MDC_EC) design to recover the quality of the video in noisy wireless networks under perform in MANETs because of their high overheads and high retransmission delay. MDC and MDC_EC produce unacceptable video quality at the receiver and fail to fulfil the QoS requirements of the video applications. We have proposed a novel routing protocol to support QoS and reduce overheads. The proposed work is twofold: i) redefine the distortion model to estimate the distortion of the transmitted video; ii) proposed a novel routing protocol model to mitigate the impact of channel noise on the video quality through selected retransmission of noisy descriptors (MDC_EC_RE).

Keywords: signal-to-noise ratio; SNR; forward error correction; FEC; multiple description coding; MDC; mobile ad-hoc networks; MANETs; quality of service; QoS; distortion; cross-layer design; CLD; noisy channels.

Reference to this paper should be made as follows: Bhardwaj, D., Kant, K. and Chauhan, D.S. (2018) 'QoS-aware routing protocol using adaptive retransmission of distorted descriptions in MDC for MANETs', *Int. J. Ad Hoc and Ubiquitous Computing*, Vol. 28, No. 1, pp.55–67.

Biographical notes: Diwakar Bhardwaj is pursuing PhD on "Improving QoS of video transmission in MANET" GLA University, Mathura under guidance of Prof. Krishna Kant. He completed his Post graduate from Uttar Pradesh Technical University, India in 2008. He is having a good experience of teaching of BTech and MTech. His area of interest are wireless networks, mobile ad-hoc networks and computer graphics.

Krishna Kant is working as Director, Institute of Engineering and Technology, GLA University. He did his MTech and PhD from IIT, Delhi, India and has more than 40 years of research and teaching experience at various foreign and Indian universities. He has supervised many PhD thesis and publish papers in many international journals of repute. He has represented the country as an expert member in the delegation representing, Govt of India, MHRD at "International Education Exhibition" at Beijing, China and "Incredible India 2003" at Kuala Lumpur, Malaysia, in 2003.

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Real-Time Attendance system based on video surveillance system

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Abstract - **This paper presents the real-time system for student's attending for a large amount of made dataset for a whole class face. The real-time attendance system task is very difficult to evaluate the attendance by recognizes the face in different the environment. Human face image in term of challenges of pose and expression to identify the person is huge variation of the system. and this is used to avoid the proxy in attendance. The proposed system is used to detect the face using Adaboost with haar cascades and identification for PCA with LDA and is used to build the real time face recognition system in multiple faces. the system is used to avoid the man power to take attendance.**

Keywords: Principal Component Analysis (PCA), Linear Discriminate Analysis (LDA), Haar Cascade Classifier.

1. INTRODUCTION

Over the years, so real time attendance system for identifying human face has challenging area of research in computer vision. Due to increase in terrorism, the needs for automated systems increase more. The most importance biometric system which have been used during these years are real time face recognition system, face detection, fingerprint recognition, speech recognition hand geometry and iris retina. Since the last decade, there is a view of increasing high rate of crime and fraud in the world. Automated face identification system for the real time attendance system to avoid the man power to take the attendance manually.

The topic of real time attendance system from live streaming and video has generated more attention for student and also provide the security system based on student identification. real time attendance system is a big challenging problem and last few decade, more attention to avoid the student identification and in this field many approaches are used to identify from the given class student dataset. The recent development in this real time attendance system field has facilated us with high accuracy and fast processing based on given dataset. There are many existing technique to identify or detection of face and recognize them but the systems technique are not to efficient to have fully automated real time attendance system.

2. PROBLEM STATMENT

The difficulties in real time attendance system are very natural. The human identification of face image in real time can have many problems like pose problem, facial expression, illumination problem, and background reflection problem. This problem creates a serious issue to identify the student and these problems are used to reduce the accuracy of a system. One of the big problem is occlusion, i.e. glass, scarf etc. used to identify the persons are entering into the lab/ class room.

3. RECOGNITION TECHNIQUES

3.1 Face detection

Face detection is an algorithm to design the system for detection of faces in the image or video frames. The technique is to determine the location size of student having the face in the image. It is focus on the frontal face detection and also solves the problem in multi view face in the images. The technique is also used to detect the facial expression in the image to treated as background which is subtracted from the images

3.1.1 Binary pattern -classification problem:

In this technique, the content so given part of image is transferred into feature vector. Classifier which provides the information to detect the particular region of the image is a face or not. Classifier provides to resolve the challenge problem to detect the false detection. Classification is done based on the feature of image.

3.1.2. Background subtraction:

In this techniques remove background to detect the foreground object into the image and also only face will crop into image. It contain only image are frontal face.

3.2.3 Color and Motion:

In this technique, color image of segment are used to find the face present in the image or not but the background has still same color will also be segmented in the image. Motion technique is used to find faces in segmented

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Search Engine Optimization

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Abstract - **Search Engine Optimization (SEO) is the process of restructuring a website to raise its ranking among search result for particular queries. This paper contains the Introduction to SEO and potential it has. This paper will also provide best practices that approved by most of search engines and compilation of practices discussed by practitioners of SEO.**

Index Terms: SEO, Crawler.

I. INTRODUCTION

SEO is the way we SEO) is the process of restructuring a website to raise its ranking among search result for particular queries such that intended target audience will easily find the page. This paper is basically divided into four section in first section will be discussing about how web search begins what kind of changes it went through, how search really works i.e. what happens when you type a query and click search.

Next section is completely dedicated to SEO in this will be discussing about why one should go for SEO. If you can't hire an outside agency to do the work then what kind of practices we can use to perform an in-house SEO. Further sections look into different tools that can be helpful in keeping the track of traffic and security of the webpage.

The last section closes by summarizing the paper by giving some key takeaways.

Note:- In this paper we try to follow some conventions such as we consider Google as our main search engine although all the practices discussed in this paper are applicable to all search engines.

II. EVOLUTION OF SEARCH

Google began as research project in 1996 at Stanford University, CA, USA. This research project was develop by Larry Page and Sergey Brin to search the web as they were doing PhD at SU. Google was started on an algorithm developed by Larry and Sergey that ranks pages on web.

Initially Google has no Ads. So when Google start add advertising it was necessary that these ads should be as relevant as search result themselves. It was also very important that these Ads should be distinctive from search results so that user will know what exactly ads and what search results are. So, there was a clear separation between ads and search results from the very beginning.
In 1999-2000 we have the search engine that works wonderfully for web pages but Google realize that as they are getting better user also growing their needs, they don't just want webpages to be search result but they want best possible information available on internet whether it is a picture or book so Google try to add Google Image. Google Image is the first one of the non-textual content search engine. As images speak thousand words it help you in describing things that can't be expressed in words such as color pink what's the best way to explain what color pink is other that Image of that color itself.

When 9/11 happens in back 2001 Google failing its user as they search for "TWIN TOWER NEW YORK" and results which showed up have nothing relevant to this sad event. This was basically because of Google crawl its index a month ago. So Google decide to add News as a specialized search as it crawl news quickly and provide multiple point of view on same story to the users.

In 2002 web is becoming richer and user actually want Google to find something if it exist on web, they don't care if it is text, video or image. So Google comes up with this notion of Universal Search where user can find any type of content at one place.

Recent addition to Google are Quick Answer which provide specific bit of information on the same search page and you need not to navigate to any other result. Like if you are looking for Cricket score it will show you on the same page or what the height of empire state building is? Now you need not to go to any page you answer will be there on same search result page. [1]

III. HOW SEARCH WORKS

Web search engines usually follow the hypertext linking structure and crawl these link using an automated

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RESEARCH ARTICLE - SPECIAL ISSUE - COMPUTER ENGINEERING AND COMPUTER SCIENCE

Search for Prioritized Test Cases in Multi-Objective Environment During Web Application Testing

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Abstract Regression testing is an expensive procedure that is implemented during maintenance phase of the Software Development Life Cycle of evolving software. During this process, test case prioritization is one of the strategies followed in which test cases are organized in a fashion so as to enhance efficiency in achieving some performance goal. During the process, there could be several aspects to be kept in mind due to resources constraints such as fault severity detected per unit of test cost, severity detection per test case execution, and execution time of test cases to detect all the faults. Keeping all such constraints in mind, the test case prioritization problem becomes a multi-objective problem where some of the objectives have to be maximized and the remaining ones minimized. In this study, experiments were performed on different versions of five web applications. The problem instance was found to vary from 5×5 test cases versus fault matrix, to 125×125 matrix. Random approach, 2-opt algorithm, improved 2-opt algorithm, greedy approach, additional greedy approach, Weighted Genetic Algorithm and Non-dominated Sorting Genetic Algorithm-II (NSGA-II) were applied to a generate prioritized test sequence which maximizes the Cost Cognizant Average Percentage of Fault Detection value, severity detection and minimizes test case execution cost to expose all the faults. The performances of these algorithms are compared, keeping these parameters in mind, and it is concluded that the performance of NSGA-II algorithm is better than that of all the other tested algorithms throughout all the experiments.

Keywords Testing web application · Test case prioritization (TCP) · Search algorithms · NSGA-II · Multi-objective optimization · Greedy algorithm

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1 Introduction

In the present E-commerce-oriented scenario, web technology plays a significant role. Users could access web applications, hosted over a web server, either on internet or intranet, through a web browser. Due to the complex structure, underlying diverse technologies and frequent changes, effective and consistent testing of web applications is essential. Other reasons for effectual testing include recurrent updates, performances of various devices through which users interact with web application [1,2], browser compatibility, checking security threats [3,4], upgradations to incorporate endless user expectations, and the need to sustain in the highly competitive era without interrupting provided services. Regression testing is required to validate such updates/up gradations.

In general, any dynamic website consists of several pages which are connected to number of other pages. If a fault occurs on any arbitrary page p_i, many provided function-

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Succinct Data Structures and Big Data

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Abstract

The growth of cloud data stores and cloud computing has been expediter and predecessor to appearance of big data. A Cloud computing is co-modification of data storage and calculating time by means of identical technologies. It has important benefits over conventional physical deployments. Nevertheless, cloud platforms originated in numerous forms and from time to time it is combined with traditional architectures. In proposed work, the main data structure used in big data is tree. Quad tree is used Graphics and Spatial data in main memory. Sub linear Algorithms are used to handle Quad tree which is inefficient. Optimized SDS can improve functionality of different sds like rank and select, FM index .Geometric data, Proteins data base, Gnome data, DNA data are large data bases for main memory. An efficient and simple representation is required in main memory of computer system. The Compressed demonstration of data has been a primary requirement nearly in the field of Computer Science for a long way. However overall quantity of storing area is not a vital problem in recent times, considering the fact that external memory can store large quantity of data and may be inexpensive, time needed to get access to information is a vital blockage in numerous programs. Right to use to outside memory has been conventionally lower than accesses to main memory, which has caused examine of recent compressed demonstrations of information which might be capable to save identical data in reduced area.

Keywords: SDS, Big Data, CT, RMQ, XML

INTRODUCTION

The Compressed demonstration of data has been a primary requirement nearly in the field of Computer Science for a long way. However overall quantity of storing area isn't a vital problem in recent times, considering the fact that external memory can store large quantity of data and may be inexpensive, time needed to get access to information is a vital blockage in numerous programs. Right to use to outside memory has been conventionally weak to monitor main memory and caused examine of recent compressed demonstrations of information which might be capable to save identical data in reduced area [1] The main application of our research is to represent raster information in Geographic Information Systems, where Information is measured. In Spatial Information it is very common property and is exploited through typical demonstrations in this area. Nonetheless, configurations of general data are similar to K2-tree do no longer take profits of this form of symmetries in spatial data. The message is demonstrated equally a chain of source symbols$x_1 x_2 \ldots\ldots, x_n$. Coding procedure of message contains making use of cipher to every sign in message and concatenating all of codeword resultant. Output of encoding is series of target symbols$C(x_1)C(x_2)\ldots\ldots, C(x_n)$ [2]. Decrypting technique is opposite method that acquires source symbol consistent to every code word to reconstruct real note. Compressed data is a universal trouble in computer science. Solidity method is utilized approximately universally to permit efficient storage and management of big datasets [3]. Large quantity of data (in kind of text, image, video, and so forth.) that needs to be managed and conveyed daily makes flawless need of solidity methods that minimize scale of data for a large effective loading and communication. Compression is powerfully connected with entropy [11]. Given a message, objective of solidity is to decrease its mass while preserving all of data it consists of. Entropy signifies common area need to keep a sign for the available data source [12]. Therefore, to decrease space vital in count to entropy of source that indicates notional smallest is the main goal of solidity. Distinction among distance of a given code and source of entropy is known as redundancy.

Succinct Data Structure:

On the basis of Rank and Select, succinct data structure is faster in runtime performance and compression than traditional data structure. The basic aim behind the usage of different data structures is to improve memory consumption of dataset. Space required for succinct data structure is less ascompared to other data structure. It has been used for information retrieval and bio-informatics [4, [15]. Then succinct data set is compared with uncompressed suffix array it require 2n+o(n)bits for tree representation. Whereas later requires klognbits per node which consumes huge memory.

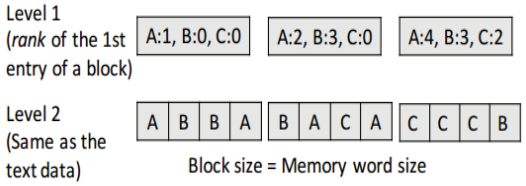

Figure 1.1 Succinct data structure implementation on hardware

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Suspicious human activity recognition: a review

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Save all to author list

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Abstract

Suspicious human activity recognition from surveillance video is an active research area of image processing and computer vision. Through the visual surveillance, human activities can be monitored in sensitive and public areas such as bus stations, railway stations, airports, banks, shopping malls, school and colleges, parking lots, roads, etc. to prevent terrorism, theft, accidents and illegal parking, vandalism, fighting, chain snatching, crime and other suspicious activities. It is very difficult to watch public places continuously, therefore an intelligent video surveillance is required that can monitor the human activities in real-time and categorize them as usual and unusual activities; and can generate an alert. Recent decade witnessed a good number of publications in the field of visual surveillance to recognize the abnormal activities. Furthermore, a few surveys can be seen in the literature for the different abnormal activities recognition ; but none of them have addressed different abnormal activities in a review . In this paper, we present the state-of-the-art which demonstrates the overall progress of suspicious activity recognition from the surveillance videos in the last decade. We include a brief introduction of the suspicious human activity recognition with its issues and challenges. This paper consists of six abnormal activities such as abandoned object detection, theft detection, fall detection, accidents and illegal parking detection on road, violence activity detection, and fire detection. In general, we have discussed all the steps those have been followed to recognize the human activity from the surveillance videos in the literature; such as foreground object extraction, object detection based on tracking or non-tracking methods, feature extraction,

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Virtual Machine Live Migration Procedures in Cloud Computing Environment

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***Abstract* - Cloud computing is where information stockpiling, figuring assets got to and driven by virtualization innovation. Late advancements in virtualization and correspondence innovations have changed the way server farms are outlined and worked by giving new devices to better sharing and control of server farm assets. Virtual machine (VM) relocation is a strategy that backings cloud specialist organizations to effectively oversee cloud assets and in this way killing the need for human supervision all things considered. VM is additionally an intense administration strategy that enables server farm administrators to adjust the arrangement of VMs with a specific end goal to better fulfil execution targets, enhance asset use and correspondence area, accomplish adaptation to internal failure, and encourage framework upkeep exercises. In spite of these potential advantages, VM relocation additionally postures new necessities on the outline of the hidden correspondence framework, for example, tending to and transfer speed prerequisites to help VM portability. Further, with a specific end goal to devise productive VM movement conspire, considering relocation costs, including correspondence cost, benefit interruption, and administration overhead are the principal challenges and vital to legitimize the advantages of the VM movement. This paper displays a determined review on the relocation of Virtual machines (VM) in cloud computing and proposes a productive calculation for live relocation in the virtual machine. Aforesaid challenges have also been analyzed in the data centre environment.**

Index Terms — Cloud Computing, Virtual Machine, Virtual Machine Migration, Virtualization

I. INTRODUCTION

Cloud computing appropriates the figuring assignments to the asset pool produced using countless. Virtualization allocates a consistent name for a physical asset and after that gives a pointer to that physical asset when a demand is made. Virtualization can in like manner be portrayed as the pondering of the four figuring resources (accumulating, getting ready power, memory, and framework or I/O).

The virtualization development presents three strategies Full Virtualization, Para Virtualization and Emulation. In this concept there is a hypervisor which is called Virtual Machine Monitor (VMM) [1].

Full Virtualization: All working frameworks in full virtualization discuss specifically with the VM hypervisor, so visitor working frameworks don't require any change. Visitor working frameworks in full virtualization frameworks are for the most part quicker than other virtualization plans [2, 3].

Para Virtualization: Para virtualization requires that the host working framework give a virtual machine interface for the visitor working framework and that the visitor get to equipment through that host VM. A working framework running as a visitor on a para virtualization framework must be ported to work with the host interface [3].

Emulation: The virtual machine restructures equipment, so it can be free of the fundamental framework equipment. A visitor working framework utilizing imitating does not should be adjusted at all [3]. VMs allude to one example of a working framework alongside at least one applications running in a disconnected parcel inside the PC. There are many virtual machines running over a single physical machine. When one physical machine gets failed, it may be required to migrate its load to another machine without any hindrance to the users [1]. The method of shifting a load in above mentioned procedure is called as migration. And also it is required to shut down the virtual machine for providing the proper benefit to customers [4].

Virtual machine Relocation has two types of Techniques [11]:

Live Migration: Live relocation can be characterized as the development of a virtual mechanism starting with one physical host then onto the next while being fueled on. When it is legitimately completed, this procedure happens with no discernible impact from the end client's perspective.

Distance-based facility location problem for fuzzy demand with simultaneous opening of two facilities

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Abstract: In the real world there are so many businesses for which the major concern is the location of facility/store so that they can satisfy the demand in an efficient manner. Therefore the companies perform extensive survey for the finding the right location before the setup of facility/store. These surveys generate the probabilistic data. In the light of these real life aspects we developed a distance based on the facility location problem (FLP) for the fuzzy demand. The distance between the customer and the facility is incorporated in the form of constraints. Model is applied over different defuzzification methods and results are compared. Results are also obtained for the option of simultaneous opening of two locations. Results show that, sometimes the two facility opening option provides the better results as compared to one. Solution procedure is provided. Numerical example is presented in order to briefly explain the model using LINGO.

Keywords: facility location problem; FLP; fuzzy demand; region search; distance-based FLP.

Reference to this paper should be made as follows: Sharma, A., Sharma, A. and Jalal, A.S. (2018) 'Distance-based facility location problem for fuzzy demand with simultaneous opening of two facilities', *Int. J. Computing Science and Mathematics*, Vol. 9, No. 6, pp.590–601.

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Real-time based human-fall detection from an indoor video surveillance

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Abstract: In this paper, we present a human fall detection method from visual surveillance. In the first step, background subtraction is performed using improved GMM to find the foreground objects. In the second step, contour-based human template matching is applied to categorise the human or non-human object. It helps to detect fall incident by providing sudden change in generated score after matching. Height-width ratio and area of contour of an object is computed in the third step to decide whether the human shape is changed or not. In the fourth step, distance between top and mid centre of rectangle covering human is computed, if it is less than a certain threshold, then human fall is confirmed. Finally, if inactive pose of human is continued till 100 consecutive frames, then an alarm is generated to alert the people at home to provide treatment on time. Experiments have been performed on two different datasets having different usual and unusual fall incidents. Experimental results show that proposed system works well efficiently and effectively in real-time for recognising human fall.

Keywords: human fall; foreground object; height-width ratio; contour.

Reference to this paper should be made as follows: Tripathi, R.K., Agrawal, S.C. and Jalal, A.S. (2018) 'Real-time based human-fall detection from an indoor video surveillance', *Int. J. Applied Pattern Recognition*, Vol. 5, No. 1, pp.72–86.

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Performance Evaluation of Chaos Based IDMA Scheme Using Joint Turbo Equalization Over Frequency Selective Fading Channel

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***Abstract*— This paper proposed the analysis of a new chaos based interleave division multiple access (CB-IDMA) wireless communication system. It also proposed the use of joint turbo equalization to mitigate the effect of intersymbol interference (ISI) in deep faded frequency selective channel. In this study, the proposed CB-IDMA system used the chaotic Tent map for the design of a robust interleaver, which produces low correlation among the users and yields better bit error rate performance. The proposed structure combined the joint turbo equalization for the cancellation of ISI and multiple access interference (MAI), which was observed as the main impediment to successful IDMA communication over frequency selective multipath fading channel. Two types of frequency domain equalizers were considered for performance evaluation; zero forcing (ZF) and minimum mean square error (MMSE) equalizer. Simulation experiments were performed in MATLAB and the results demonstrated that the proposed CB-IDMA system with joint turbo equalization may be preferred in deep fading environment.**

***Index Terms*— Chaos IDMA; Logistic Map; Tent Map Interleaver; Turbo Equalization.**

I. INTRODUCTION

High quality and high speed multimedia transmission is essential for future wireless communication. The basic blocks of wireless communication system is shown in Figure 1. One of the biggest challenges in the wireless communication system is the prominent impairment of the frequency selective fading channels. Researchers have cited the main reason for the impairment is the diversity against fading and cancellation of the worst case cell interference of different users. Additionally, the solution for this difficulty can be outlined as the interleave-division multiple access (IDMA) that uses chip-based interleavers for distinguishing the users and the bandwidth, that are dedicated to coding [1-4]. The interleavers are also utilized to deal with the error bursts. Further, it is argued that an efficient interleaver can improve the performance of iterative IDMA system.

On the other hand, recently the role of chaos has been manifested in spread spectrum communication systems [5-8]. It has been argued that the chaotic sequences offer many interesting properties subjected to computational complexity or storage requirement [9-10]. Apart from that, the chaotic sequences also exhibits the randomness, hence allowing the chaotic sequences to be utilized in the generation of robust interleavers for IDMA system. However, intersymbol interference (ISI) and multiple access interference (MAI) constitute the major impediments in the transmission over frequency selective deep faded channel. Although ISI is well treated by equalization or detection, recovery of data from equalized symbols is achieved through decoding operation. Due to its complexity, both of these operations have been considered separately and substantial performance degradation is induced [11-14]. Accordingly, algorithms that perform the equalization and decoding operation on the same set of received data have been introduced. This process is popularly known as Turbo equalization and were first suggested in [8]. Li [9] proposed the joint operation of equalization and coding. Wang [19] also suggested the turbo equalization for satellite channels. Peng [20] suggested the MMSE-based turbo equalization.

The main contribution of this paper is the use of the joint processing of equalization (MMSE-based) and decoding (Turbo equalization) in IDMA system, to minimize the bit error rate (BER) in deep faded channels without compromising the complexity. Secondly, the performance of modified Tent map interleaver based IDMA i.e. CB-IDMA is also compared with the random interleaver based IDMA to propose the superiority of CB-IDMA.

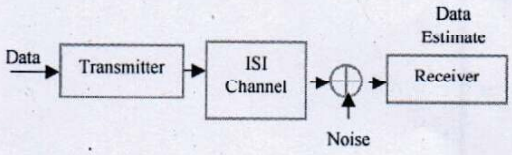

Figure 1: Basic building blocks of wireless communication system

The rest of the paper is organized as follows. The linear chaos based transmitter and receiver structure of IDMA are described in Section II. In section III, the modified Tent map interleaver design is discussed. Joint Turbo equalization is described in Section IV. Section V provides the set of simulation results and section VI concludes the paper.

II. THE PROPOSED CB- IDMA SYSTEM MODEL WITH JOINT TURBO EQUALIZATION

Figure 2 depicts the IDMA transmitter and the receiver structure with Turbo equalization. Before discussing the structure of CB-IDMA system along with Turbo equalization, some frequently used notations are elaborated. The operator $E(\cdot)$ is known as expectation with respect to the joint probability density function (pdf) of transmitted symbol x_k.

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Fruits and vegetables quality evaluation using computer vision: A review

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ABSTRACT

In agriculture science, automation increases the quality, economic growth and productivity of the country. The export market and quality evaluation are affected by assorting of fruits and vegetables. The crucial sensory characteristic of fruits and vegetables is appearance that impacts their market value, the consumer's preference and choice. Although, the sorting and grading can be done by human but it is inconsistent, time consuming, variable, subjective, onerous, expensive and easily influenced by surrounding. Hence, an astute fruit grading system is needed. In recent years, various algorithms for sorting and grading are done by various researchers using computer vision. This paper presents a detailed overview of various methods i.e. preprocessing, segmentation, feature extraction, classification which addressed fruits and vegetables quality based on color, texture, size, shape and defects. In this paper, a critical comparison of different algorithm proposed by researchers for quality inspection of fruits and vegetables has been carried out.

Contents

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1. Introduction

In representing the conception for human brain, images are the most basic method in physical classification of foodstuff and agricultural industry. Factors affecting fruits and vegetables can be quantified visually which is laborious, expensive and is easily effected by physical factors, including inconsistent evaluation

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1319-1578/

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Article

A Novel Approach to Design SRAM Cells for Low Leakage and Improved Stability

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Abstract: The semiconductor electronic industry is advancing at a very fast pace. The size of portable and handheld devices are shrinking day by day and the demand for longer battery backup is also increasing. With these requirements, the leakage power in stand-by mode becomes a critical concern for researchers. In most of these devices, memory is an integral part and its size also scales down as the device size is reduced. So, low power and high speed memory design is a prime concern. Another crucial factor is the stability of static random-access memory (SRAM) cells. This paper combines multi threshold and fingering techniques to propose a modified 6T SRAM cell which has high speed, improved stability and low leakage current in stand-by mode of the memory cell. The simulations are done using the Cadence Virtuoso tool on UMC 55 nm technology.

Keywords: CMOS technology; SRAM; MTCMOS; fingering; leakage current; SNM

1. Introduction

With the rapid growth in the semiconductor industry, the packing density of integrated circuits ICs is ever increasing and the component or transistor size is reducing. Static random-access memory (SRAM) is an integral part of modern-day electronic devices. To achieve higher integration density of SRAM, a minimum sized memory cell is desirable, but this significantly increases leakage current. In lower technology, stand-by leakage is a major factor contributing to total leakage current. Portable handheld devices also remain in stand-by mode for considerable amounts of time; hence, leakage in this mode also is a serious concern as it reduces the battery backup time. To reduce the leakage current in complementary metal oxide semiconductor (CMOS) technology, the circuit is operated on lower supply voltage but this in turn slows down the speed of the circuit. Delay can be reduced by using transistors with a lower threshold voltage, but this again increases the leakage current (mainly the sub-threshold leakage current). There are contrasting requirements and good optimization is necessary to design a memory cell with lower stand-by leakage and good stability. Lower voltages and smaller size cause significant degradation of data stability in cells [1]. The stability of SRAM depends on the static noise margin (SNM), which in turn depends on various other cell parameters. Various techniques for leakage power reduction and improvement in cell stability have been proposed by various researchers. Multi-threshold CMOS (MTCMOS) is one of the prominent techniques to minimize leakage power [2]. Fingering is another technique that can be used for reduction in leakage power [3,4]. This paper combines the two techniques to analyze the effect on leakage current and the SNM of the cell. The simulations are performed on the Cadence Virtuoso tool using UMC 55 nm technology.

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Cooperative relay beamforming in IDMA communication networks

Aasheesh Shukla*, Vishal Goyal*
Puneet Mishra**, Vinay Kumar Deolia*

In this paper, a new combination of Interleave division multiple access (IDMA) and spatial diversity offered by cooperative relay aided distributed beam forming is proposed. In the offered scheme communication strategy consists two steps. All users broadcast their message to relays in the first step and then relays amplifies and forward the information to the desired destination. IDMA, which is popular non-orthogonal multiple access (NOMA) technique is used to combat the effect of multiple access interference (MAI) at relay as well as destination nodes. Each relay processed the signal to maintain the QoS of destination. The goal of this work is to find the appropriate beam forming weights by minimising the transmit power and without compromising the QoS in terms of SINR. However power minimization is not the convex problem, so semi-definite relaxation is used to modify the problem in to semi-definite programming (SDP) problem and the conventional SDP problem solver CVX is used for solution. The numerical explanation and simulation experiment of the proposed scheme shows the performance improvements in terms of bit error rate.

Keywords: IDMA, QoS, cooperative relay beamforming, semidefinite programming

1 Introduction

Interference and signal fading are two major impairments in wireless communication system that can have severe destructive effect on the quality and reliability of wireless transmission. To achieve robustness against fading, diversity is the popular solution. Among many schemes, spatial diversity is prominently used in wireless transmission which used multiple antennas to enhance the link reliability, throughput and spectral efficiency of the system. However, in some wireless networks; such as in mobile communication (IDMA), the use of multiple antennas are not feasible due to the size of devices. The concept of cooperative communication can be the feasible solution of this problem. In cooperative communication, each device transmits their own information and also acts as a helping agent *ie* relay for other users. The relay nodes desires to cooperate to establish the link between all the sources and destination and this network can be named as 'cooperative relay networks' [1–2]. This relaying network is popular in dealing with multipath fading scenario because of its simplicity and acceptable performance as well as range extension which is achieved by multi-hoping [3–4].

Relay network presents the nodes architecture utilizing the transmit and receive beamformer to transmit the power of each signal source to its destination node. The basic node architecture of cooperative relay network is presented in Fig. 1. Several relay protocols have been proposed on the basis of their relaying functionality such as Decode and forward (DF), amplify and forward (AF), compress and forward and cooperative cooperation. However large number of signal sources or relay nodes can lead to increase in multiple access interference (MAI), which can degrade the network performance [3–8]. Also the channel access schemes in relay networks are generally orthogonal which produce excess rate loss in the case of large number of users or relaying nodes as well as orthogonal schemes are having insufficient usage of time and frequency resources.

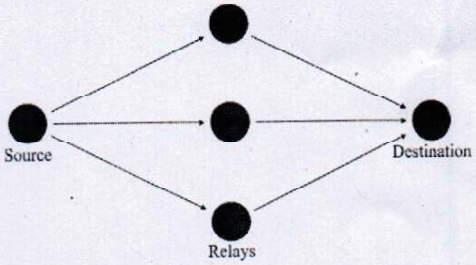

Fig. 1. Basic architecture of cooperative relay networks

On the other hand, interleave division multiple access (IDMA) which is modified version of CDMA scheme, efficiently utilize the time and frequency resources and also suggested as popular code domain non-orthogonal multiple access (NOMA) scheme for 5G communication. Cooperation in CDMA scheme has been prominently studied in literature. In [10], asynchronous cooperative CDMA is presented and the performance is studied in terms of outage probability. The MIMO cooperative CDMA has

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REVIEW ARTICLE

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Multiport MIMO antennas with mutual coupling reduction techniques for modern wireless transreceive operations: A review

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Abstract

The present technology fulfills the requirement of high data rate and high channel capacity using multiple input multiple output (MIMO) technology. The MIMO capacity of the system is increased linearly but due to the multiple antennas placed near to each other, problem of mutual coupling exists, which degrades the maximum achievable performance of the system. The problems of multipath propagation can be solved using MIMO system. The isolation improvement methods decrease the mutual coupling among antenna elements, and improve the gain and efficiency of the system. In this paper, decoupling network isolation approach, parasitic element approach, defected ground structure, Neutralization line, isolation improvement based on meta-materials, isolation improvement using PIN diode, varactor diode, and feeding structure have been incorporated, and their merits and demerits have been discussed. The effect of different permittivity material on antenna parameters has also included.

KEYWORDS

ECC, isolation, MEG, MIMO, TARC, WLAN

1 | INTRODUCTION

The antenna is the most important part of the communication system. It is responsible for transmission of signals into free space and vice versa. In old mobile communication systems, a single antenna was adapted at the transmitter and a single antenna at the receiver. This communication scheme is known as a single input single output (SISO). SISO structure is very simple and can be designed easily, but is susceptible to the problems caused by multipath effects.[1] When an electromagnetic wave meets with the obstructions such as buildings, hills, wires, and so forth the wave fronts spread over the environment and thus that wave takes number of paths to arrive at the destination. The delayed arrival of spreaded portions of the signal causes troubles such as fading, cliff effect and irregular reception. In a digital infrastructure system, it causes a decrease in data rate and an increase in the number of errors.[2]

In order to reduce problems caused by multipath wave propagation in SISO, smart antenna technology is required. The 3 forms of smart antennas are known as single input multiple output, multiple input single output, and multiple input multiple output (MIMO). In MIMO antenna technology, multiple antennas are used at the source (transmitter) and at the destination (receiver).[3,4] The antenna element at each end of the communication system is required to minimize errors and to enhance data rate.[5,6] The use of multiple antenna elements along with the broadcast of multiple signals at the source and destination solves the problem of multipath propagation.[7] MIMO has produced interest because of its promising applications in wireless local area network (WLAN), digital television, metropolitan area network, and in wireless interoperability of microwave access.[8,9] The performance of the MIMO system can be obtained in terms of capacity, envelope correlation coefficient (ECC), mean effective gain (MEG), total active reflection coefficient (TARC), and diversity gain (DG).

1.1 | Mathematical aspects of MIMO antenna design

The mathematical aspects of the MIMO antenna design has been explored in this section, in relation with the SISO

Analysis and design of tent map interleaver for interleave division multiple access scheme

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Abstract: Interleavers are the main component of almost all multiple access systems, such as Code Division Multiple Access (CDMA) and Interleave Division Multiple Access (IDMA henceforth). In IDMA systems, interleavers are crucially important for user separation that consequently also contributes maximising the system throughput. The paper intends to claim an efficient Tent map based design of interleaver (TMI henceforth) generation which has less computational complexity and is more efficient in bandwidth compared to the existing prevailing algorithms in the domain. The proposed scheme is based on chaos theory and the simulation results show that TMI based IDMA can achieve the good BER performance without the need of extra memory resources.

Keywords: IDMA; chaos theory; Tent map based interleaver; logistic interleaver.

Reference to this paper should be made as follows: Shukla, A. and Deolia, V.K. (2018) 'Analysis and design of tent map interleaver for interleave division multiple access scheme', *Int. J. Wireless and Mobile Computing*, Vol. 15, No. 4, pp.382–388.

Biographical notes: Aasheesh Shukla obtained his Master degree in Electronics and Communication Engineering from HBTI, Kanpur. He completed his PhD from GLA University, Mathura in 2017. His areas of interest include multiple access schemes, IDMA and other latest trends in technology. He has more than ten years of experience in teaching and research in the area of wireless communication.

Vinay Kumar Deolia is working as a Professor and Head of the Department of Electronics and Communication Engineering, Institute of Engineering and Technology, GLA University, Mathura, India. He completed his PhD in back stepping control from NIT, Allahabad, India. His areas of interest include nonlinear control systems, IDMA, and other latest trends in technology. He has more than 20 years of experience in teaching and research.

1 Introduction

Interleavers are an important and vital part of wireless communication, specifically over bursty channels. The use of interleavers is generally to rearrange the ordering of binary sequences and hence the bursty channel appears like random error channel (Ping et al., 2006). Figure 1 shows the simple representation of randomisation of burst errors. The role of interleavers is obvious and popular in chip interleaved code division multiple access (CDMA) systems. In CDMA scheme, all the users are separated on the basis of spreading codes and share the whole bandwidth simultaneously. This multiple access scheme has proved better in comparison to other classical schemes but severely suffers from multiple access interference (MAI) and Intersymbol Interference (ISI). The performance of CI-CDMA can be improved if the entire bandwidth expansion is devoted to the coding. So, the spreading and coding are combined to improve the coding gain and interleavers are devoted to distinguish the users. Interleaver based multiple access scheme is popularly known as interleave division multiple access (Pupeza et al., 2006). It inherits many advantages of CDMA and also allows a simple iterative Multi User Detection (MUD) strategy (Kitada and Ogasawara, 2006). Therefore, the better choice of interleaver may have a significant impact on the performance of IDMA system (Yoshida et al., 1983).

Since an efficient interleaver can enhance the throughput of IDMA system, researchers in the past have given proper attention to the designing of optimum interleaver matrix. There are many popular interleaver designs available in the literature such as Pseudo-random Interleaver, Orthogonal Interleaver (OI), Helical Interleaver, Tree based Interleaver (TBI), Nested Interleaver, Shifting Interleaver, Deterministic Interleavers and many more (Zhang and Hu, 2007). The basic interleaver design

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Owl search algorithm: A novel nature-inspired heuristic paradigm for global optimization

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Abstract. This paper presents, a novel nature-inspired optimization paradigm, named as owl search algorithm (OSA) for solving global optimization problems. The OSA is a population based technique based on the hunting mechanism of the owls in dark. The proposed method is validated on commonly used benchmark problems in the field of optimization. The results obtained by OSA are compared with the results of six state-of-the-art optimization algorithms. Simulation results reveal that OSA provides promising results as compared to the existing optimization algorithms. Moreover, to show the efficacy of the proposed OSA, it is used to design two degree of freedom PI (OSA-2PI) controller for temperature control of a real-time heat flow experiment (HFE). Experimental results demonstrate that OSA-2PI controller is more precise for temperature control of HFE in comparison to the conventional PI controller.

Keywords: Nature-inspired algorithm, unconstrained optimization, two degree of freedom PI controller, Heat flow experiment

1. Introduction

In recent years, metaheuristic optimization techniques have gained significant attention of researchers due to successful application of these techniques in a variety of complex optimization problems. These techniques are found more effective than conventional methods which use derivative information of function. Two eminent features of any metaheuristic technique are exploration and exploitation [1]. Exploration phase of algorithm, also known as diversification, redirects the search towards unvisited regions of the search space, in order to find new but potentially better solutions. On the other hand, exploitation or intensification phase helps the algorithm to search in the neighbourhood of current best solutions. There are distinct objectives behind the development of modern metaheuristics such as fast and effortless handling of complex as well as large problems and designing more effective and robust techniques [2].

There is no limitation on the source of motivation to design a metaheuristic technique. As an illustration, the gravitational search algorithm (GSA) is inspired from law of gravitation and mass interaction [3], interior search algorithm (ISA) is based on the concepts of interior designing and decoration [4] etc. Nevertheless, nature is always a primary source of motivation for proposing new metaheuristic techniques. A brief literature review of nature-inspired optimization algorithms is presented in Table 1. Various nature-inspired optimization algorithms are available in literature, however "no free lunch (NFL)" theorem [19] supports the present study as proposed

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Research paper

Low leakage SRAM cell for ULP applications

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Abstract

Leakage power is becoming a major concern in battery operated and hand held devices. With the ever reducing size of electronic devices and the use of memory in most of them, the need for low power devices is vastly increasing. These devices are either in active or standby mode of operation. Leakage power in standby mode of operation is of major concern and various methods to minimize it have been proposed at various stages of design cycle. This paper proposes fingering technique that can be used in 6T SRAM cell to reduce leakage power. Leakage power is calculated for 6T SRAM cell designed using two fingers in access transistors and on comparison with conventional 6T SRAM cell, significant reduction in leakage current is obtained. The layout has been designed in UMC 55nm technology using Cadence Virtuoso tool and it has been shown that the leakage power and delay can be reduced.

Keywords: *SRAM; Low Power; Leakage Current; Fingering; CMOS.*

1. Introduction

The device size of portable and hand held devices is day by day shrinking which makes the leakage power and battery life a very crucial aspect of electronic devices. Leakage power has been a major issue of concern and will continue to be an important research area as smaller the device size more prominent is the contribution of leakage power in total power dissipation. The requirement is not only of smaller size but also of higher speed, as the speed of microprocessor based devices increases large quantity of data is to be fetched at a very high speed. This makes the design of cache memory an issue of major concern. Mainly Static Random Access Memory (SRAM) is needed for cache memory design. SRAM using Complementary Metal Oxide Semiconductor (CMOS) technology is the preferred choice for cache memory design. There are various configuration of SRAM cell, of which 6T SRAM cell is the most preferred choice due to robustness, low power and low voltage operation [1]. In electronic devices vast majority of memory cells remain in standby mode for large fraction of time [2] so static power becomes more critical for SRAMs. As reported in International Technical Roadmap for Semiconductors (ITRS), transistors devoted to memory structures in microprocessor based system is about 70% today and is expected to increase to 80% in near future [3]. SRAM cell consumes energy in active as well as in standby mode, however standby leakage power becomes more significant for lower technologies. To reduce standby leakage power several techniques have been incorporated in SRAM cell. This paper proposes a modified 6T SRAM cell which has lower leakage current than conventional 6T SRAM cell. Section II describes the various components of leakage current MOS transistor and 6T SRAM cell, section III overviews various leakage current reduction techniques already proposed for 6T SRAM cell, section IV describes proposed technique and finally results are discussed in section V.

2. Leakage components in bulk CMOS and 6T SRAM cell

There are mainly three main components of leakage current when the transistor is in non- conducting state. They are: Sub-threshold leakage current (I_{sub}), gate induced drain lowering current (I_{GIDL}) and punch through leakage current (I_{punch}).Apart from these there are two other components of leakage current which are indepenent of the conduction of device, they are, gate tunneling current and junction reverse bias leakage current due to band to band tunneling.
As the technology scales down, the device parameters like threshold voltage, oxide thickness and channel length are also reduced. Fig. 1 shows the different components of leakage current in MOS transistor.

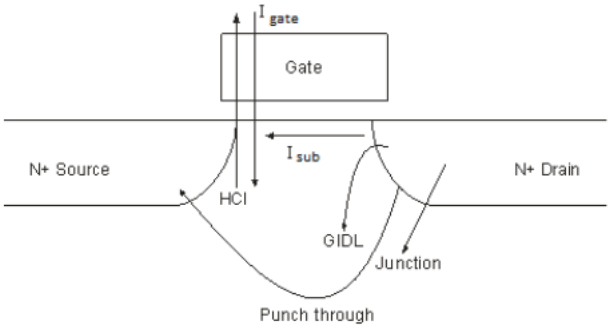

Fig. 1: Leakage Current Components in MOS Transistor.

2.1. Sub threshold leakage current

When the gate voltage of device is lower than its threshold voltage, weak inversion region exists between drain and source region. The

Journal of Electronic Design Technology

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Stability Analysis in SRAM Cell for Deep Submicron Design

Tripti Tripathi, D.S. Chauhan, S.K. Singh

Abstract

Abstract

Memory is an integral part of present day battery operated and hand held electronic gadgets. As the size of devices shrinks so does the size of memory used in these devices also, this increases the demand for low power devices. Leakage current is one of the prominent factors that contribute to significant portion of the total power dissipation; in fact at lower technologies it becomes comparable to switching component. Device scaling also affects various electrical parameters like noise voltage and cell stability. The static noise margin (SNM) of cell greatly determines its stability. To address upon this issue various techniques have been proposed at various levels of design cycle. This paper analyzes SNM for 6T SRAM cell with respect to various parameters like cell ratio (CR), pull-up ratio (PR), supply voltage (V_{dd}), data retention voltage (DRV) and temperature. It also analyzes the variation of read static noise margin (RSNM) and writes static noise margin (WSNM) with the variation in V_{dd}. simulations are carried out using cadence virtuoso tool in 90 nm and 45 nm technology.

Keywords: *SRAM, Static Noise Margin, DRV, CR, PR, RSNM, WSNM*

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DESIGN AND SIMULATION OF LNA FOR UWB APPLICATION

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Abstract - This paper presents a new noise cancellation and current reuse topology for low noise amplifier. the working guideline noise cancellation and current- reusing are proposed to improve the performance of noise and reduce the power dissipation. by using auxiliary path technique of noise cancellation schema is realized by mutually cancelling the noise current of the common source and common gate amplifier. fabricated in 180nm CMOS, the LNA measured voltage gain >10db, minimum noise figure of 2 db. the whole circuit only consumes a power dissipation of 1.4mW.LNA structure composed of a Common gate stage and a Common source stage solves the fundamental tradeoff between noise figure and impedance matching and also offer voltage gain.

Keyword - LNA; Noise Cancellation; Low Power; Impedance Matching, Noise Figure.

I. INTRODUCTION

The 3-10 GHz Ultra-Wide Band (UWB) frequency band is commonly used in various applications. Low noise amplifier is a standout amongst the most imperative modules situated at the front end of the radio frequency (RF) receiver.1 The sensitivity of a RF receiver largely depends on the gain and noise performance of the LNA. Since a typical RF receiver often uses up more than 40% of the power consumption in the entire wireless communication system,The LNA is an instrumental segment of a UWB collector. A LNA is put at the front-end of a radio collector circuit The LNA's commotion figure has a noteworthy effect in choosing the framework's general NF.

Appropriated enhancer topology [3]– [5] can accomplish synchronous broadband info coordinating and high pick up. In any case, the LNAconveyed design experiences high power utilization and huge chip territory credited to the utilization of a few winding inductors or transmission lines. Basic entryway enhancers [6]– [9] can understand broadband info coordinating by appropriately outlining the information transistor's transconductance to the detriment of substantial current expended. Together with switchable inductor [6] or inductive topping [7] procedures at the yield, the NF of a typical door LNA is around 2.2 dB if long-channel transistors are utilized. For short-divert gadgets in cutting edge CMOS process, the NF is far more detestable (>3 dB). On the other hand. Commotion crossing out has turned into a promising system in figuring it out a high performance LNA [4]. The low noise figure (NF) of a noise-canceling LNA is realized by using an auxiliary path which cancels out the noise current generated by the common-gate (CG)stage while enhancing the input signal. In this paper, a noise-canceling schema is realized by mutually canceling the thermal noise currents of the common-source (CS) transistors and the CG transistors. Compared with traditional noise canceling scenarios, the proposed LNA achieves a comparable Noise figure with a much lower power dissipation. The receiver features an LNA took after by a mixerthe mixer expels the carrier fromthe got radio frequency flag. As a rule, there is an Automatic gain control (AGC) hinder between the mixer and the Analog to Digital Converter (ADC). The reason for this square is to adjust the enhancement or lessening of the got motion in a way that it uses the most extreme scope of framework and fed to the digital to signal block for processing.The voltage sensing stage (CS stage) is an enhance the voltage gain of the stage.

1. Cascode Topology –

The Cascode is a mix of a CS device with a Common gate stack. This has the impact of improve the voltage gain of the LNA the extra Cascode device comprises of a transistor biased common-gate, giving a large dynamic load to update voltage gain at high frequency. It is ordinary to set the Cascode device with a similar channel width versus length proportion as the primary single-organize

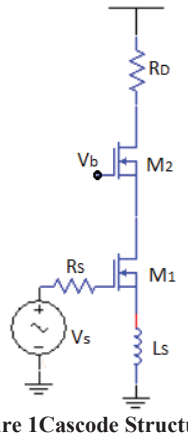

Figure 1Cascode Structure

single stage CS amplifier can offer limitless info obstruction, direct yield opposition and direct dc

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U Slot Loaded Wideband Rectangular Microstrip Patch Antenna for Wireless Applications

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Abstract: This study present a simple and slotted wideband microstrip patch antenna for wireless communication system. A U-shape slot has been loaded for design of the rectangular microstrip antenna. Doing this the bandwidth of antenna is improved upto 25.80%. The frequency of the proposed antenna design lie in the range of 1.847-2.394 GHz. This frequency band is suitable for wireless communication applications. The narrow bandwidth is major disadvantage of microstrip patch antenna hence this study provide an alternative solution for increase the bandwidth. The maximum gain of this designed antenna has been enhanced up to 3.11 dBi and radiation efficiency is 95.61%. A microstrip line feed of 50 Ω has been used in this proposed slotted microstrip antenna. The simulation process has been done by IE3D simulation software tool.

Key words: U slot, band width, compact, microstrip patch, microstrip line feed, frequency

INTRODUCTION

The demand of compact microstrip antennas with high gain and wideband operating frequencies has been increased for development of wireless communication system. Microstrip patch antenna possesses many advantages such as low profile, light weight, small volume and compatibility with Microwave Integrated Circuit (MIC) (Surjati *et al*., 2010). The narrow bandwidth and small gain are the major disadvantages of microstrip antenna. The bandwidth of microstrip antenna can be enhanced by loading U slot in radiating patch (Khan and Chatterjee, 2016). The antenna radiating patch is directly feed through 50 Ω microstrip line feed. The frequency band of proposed antenna is lies in between 1.847-2.394 GHz which is suitable for wireless communication applications (Zade and Choudhary, 2011; Hu *et al*., 2011; Roy and Bhunia, 2012). The size and bandwidth of microstrip antenna also depends on substrate material. On increasing the dielectric constant, the size of antenna decreases as well as bandwidth and efficiency also, decreases.

Antenna design specifications: The proposed antenna design is shown in Fig.1. A glass epoxy used as substrate of a dielectric constant 4.4 is used in this antenna design (Balanis, 2005). The patch width and length are 30 and 40 mm, respectively. The design has ground plane width 40 and length 50 mm. The dielectric substrate height is 1.6 mm and 0.0013 is used as loss tangent. Radiating patch is fed through 50 Ω microstrip line feed. IE3D simulation software tool has been used for simulation work. All the specifications are given in Table 1 and 2.

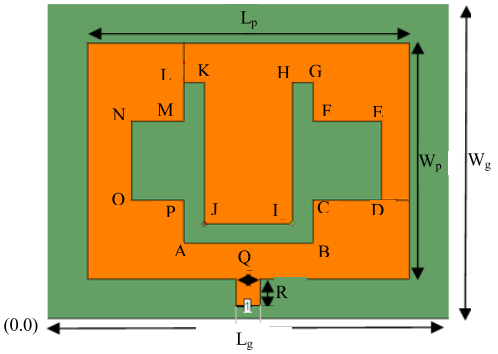

Fig. 1: Geometry proposed microstrip antenna

Table 1: Antenna design specifications

Parameters	Values (mm)
Dielectric constant ε_r	4.4
Substrate height h	1.6
Patch width W_p	30
Patch length L_p	40
Ground plane width W_g	40
Ground plane length L_g	50
Length of feed strip Q	3
Width of feed strip R	3

Table 2: Antenna parameters

Parameters	Values (mm)
AB	16
BC, PA	5.5
CD, EF	8.5
DE, NO	10
EF	8.5
FG, LM	5
GH, KL	2.5
HI, JK	18
IJ	11
MN	6.5
OP	5.5

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Slot Loaded Multi Band Rectangular Microstrip Patch Antenna for Wireless Applications

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Abstract: This study present a simple and slotted muti band rectangular microstrip patch antenna for wireless communication system. A inverted U-shape slot and inverted L-shape notch has been loaded for design of the rectangular microstrip antenna. Doing this the antenna is resonating with multi band frequency range and fractional bandwidth of multi band proposed antenna is 6.09% (lower band), 23.11% (middle band) and 12.29% (upper band) and antenna is resonating at 2.461, 3.938 and 5.579 GHz, respectively. The multi band frequency of the proposed antenna design lie in the range of 1.97-2.24, 3.30-3.65 and 4.55-5.36 GHz, respectively. This frequency band is suitable for wireless communication applications. The maximum gain of this designed antenna has been enhanced up to 4.803 dBi and antenna efficiency is 99.87%. A microstrip line feed of 50 Ω has been used in this proposed slotted microstrip antenna. The simulation process has been done by IE3D simulation software tool.

Key words: Inverted, slot, bandwidth, notch, microstrip, patch, microstrip line feed

INTRODUCTION

The demand of compact microstrip antennas with high gain and wideband operating frequencies has been increased for development of wireless communication system. Microstrip patch antenna possesses many advantages such as low profile, light weight, small volume and compatibility with Microwave Integrated Circuit (MIC) (Balanis, 2005). The narrow bandwidth and small gain are the major disadvantages of microstrip antenna. The bandwidth of microstrip antenna can be enhanced by loading inverted U slot and inverted L notch in radiating patch (Khan and Chatterjee, 2016; Chen and Chen, 2009). The antenna radiating patch is directly feed through 50 Ω microstrip line feed. The frequency band of proposed antenna is lies in between 1.97-2.24, 3.30-3.65 and 4.55-5.36 GHz, respectively which is suitable for wireless communication applications (Zade and Choudhary, 2011; Roy and Bhunia, 2012; Hu *et al*., 2011). The size and bandwidth of microstrip antenna also depends on substrate material. On increasing the dielectric constant, the size of antenna decreases as well as bandwidth and efficiency also decreases (Pozar, 1992).

MATERIALS AND METHODS

Antenna design specifications: The proposed antenna design is shown in Fig. 1. A glass epoxy used as substrate of a dielectric constant 4.4 is used in this antenna design (Balanis, 2005). The patch width and length are 24 and 32 mm, respectively. The design has ground plane width 34 mm and length 42 mm. The dielectric substrate height is 1.6 mm and 0.01 is used as loss tangent. Radiating patch is fed through 50 Ω microstrip line feed. IE3D simulation software tool has been used for simulation work. All the specifications are given in Table 1.

Table 1: Antenna design specifications

Parameters	Value (mm)
Dielectric constant (ε_r)	4.4
Substrate height (h)	1.6
Patch width (Wp)	24
Patch length (Lp)	32
Ground plane width (Wg)	34
Ground plane length (Lg)	42

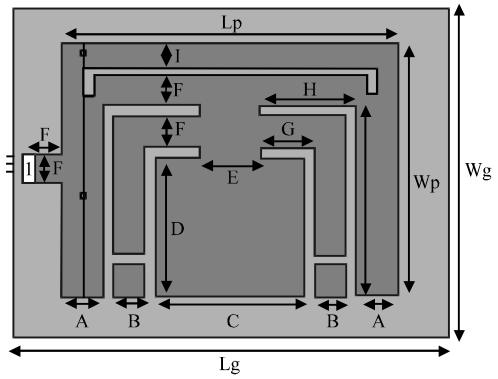

Fig. 1: Geometry of proposed microstrip antenna

Antenna design procedure: Figure 1shows the design of proposed inverted U slot and inverted L notch loaded

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Stacked Rectangular Microstrip Patch Antenna Loaded with Slot Using Microstrip Line Feed

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Abstract: A new, simple and slotted stacked microstrip patch antenna is design with parasitic patch element for wireless communication system. A U-shape slot has been loaded in lower patch of the rectangular microstrip antenna and rectangular slot has been loaded in parasitic patch element. Due to this the bandwidth of patch antenna is improved from 25.80-30.14%. The frequency of the conventional single layer antenna design lie in the range of 1.847-2.394 GHz with resonance frequency 2.203 GHz and proposed stacked antenna is resonating with multi band frequency range and fractional bandwidth of multi band proposed antenna is 30.14% (lower band), 0.4% (middle band) and 2.56% (upper band). A microstrip line feed of 50 Ω has been used in this proposed slotted microstrip antenna. The simulation process has been done by IE3D simulation software tool.

Key words: Stacked, slotted, parasitic, bandwidth, patch, line feed

INTRODUCTION

Due to rapid development of wireless communication systems, the demand for compact, wideband operation and high gain microstrip antenna has increased. Microstrip patch antenna possesses many advantages such as low profile, light weight, small volume and compatibility with Microwave Integrated Circuit (MIC) (Surjati *et al*., 2010). The narrow bandwidth and small gain are the major disadvantages of microstrip antenna. S-shaped multi-band stacked microstrip antenna has been designed for wireless communication applications including WiMax, WLAN, Bluetooth and C-band applications such as satellite communications, weather radar systems with coupling structure between the patches and a wide ground slot to improve antenna characteristics (Ankita *et al*., 2016). A trapezium shaped patch with T shape slot loaded circularly polarized microstrip patch antenna has been design for wireless application (Kumar and Srivastava, 2014).

In this study a wideband stacked patch antenna without air gap has been design for enhancing the bandwidth. Initially the bandwidth of microstrip antenna can be enhanced by loading U slot in lower radiating patch (Khan and Chatterjee, 2016) and further increased by stacked configuration with slotted parasitic patch element. The lower driven radiating patch is loaded with U shape slot and directly feed through 50 Ω microstrip line feed. The upper rectangular parasitic patch element is also loaded with rectangular slot. Due to this the proposed stacked antenna design resonates with multiband frequency which is lies in between 1.715-2.323, 2.453-2.463 and 2.696-2.766 GHz, respectively. This multiband frequency range is suitable for wireless communication applications (Nandgaonkar and Deosarkar, 2009; Egashira and Nishiyama, 1996; Roy and Bhunia, 2012; Rao and Chaitanya, 2013). The size and bandwidth of microstrip antenna also depends on substrate material. On increasing the dielectric constant, the size of antenna decreases as well as bandwidth and efficiency also decreases (Balanis, 2005).

MATERIALS AND METHODS

Antenna design specifications: The proposed single layer U slotted antenna design is shown in Fig. 1. Glass epoxy substrate is used for antenna design as a dielectric material with dielectric constant 4.4 (Pozar, 1992). The both dielectric substrate height h_1 and h_2 are 1.6 mm and 0.0013 is used as loss tangent. The lower driven radiating patch is feed through 50 Ω microstrip line feed. IE3D simulation software tool has been used for simulation work. All the specifications are given in the Table 1.

Antenna design procedure: Figure 1 shows the design of proposed single layer U slot loaded microstrip antenna. The patch width and length are 30 and 40 mm, respectively. The design has ground plane width 40 mm and length 50 mm. In designing of proposed antenna on IE3D tool ground plane is selected from (0, 0) at lower left corner (Table 2 and 3).

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RESEARCH ARTICLE

WILEY INTERNATIONAL JOURNAL OF RF AND MICROWAVE COMPUTER-AIDED ENGINEERING

Meander line MIMO antenna for 5.8 GHz WLAN application

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Abstract

A four port compact low profile planar MIMO antenna with meander line radiators and with polarization diversity effect has been proposed to cover 5.8 GHz wireless local area network application. The proposed MIMO antenna has −10 dB impedance bandwidth of 1.4 GHz (5.3–6.7 GHz) along with the compact size of 38 × 38 mm^2 and an envelope correlation coefficient (ECC) of less than 4×10^{-4} in the whole band. The proposed antenna resonates at 5.8 GHz frequency, having return loss of −43.2 dB. The isolation between diagonal and opposite ports is more than 10 and 12 dB, respectively, in the presented frequency band. The total active reflection coefficient frequency response shows more than 1.0 GHz of bandwidth in the whole band. The antenna gain is more than 4.0 dBi in the operating frequency band. The radiating elements are very close to each other to make the design very compact.

KEYWORDS

ECC, MIMO, TARC, WLAN

1 | INTRODUCTION

Varity of antennas are available for wireless applications. A single input single output antenna has a low capacity, low data rate and average transmission quality whereas multiple input multiple output (MIMO) has high channel capacity, high data rate, low latency, and better link reliability over the multipath fading.[1] Various lengths of antenna elements have a significant role in deciding the value of gain, efficiency, size, and far field radiation characteristics.[2] A multielement antenna with metamaterial and defected ground structure limits the adverse effects of mutual coupling and surface wave propagation.[3] The Poly-dimethyle siloxane multilayer substrate produces the same effect like the metamaterial and defected ground on multielement antenna.[4] The transparent multiband optical MIMO with micrometal mesh conductive film is used for mutual coupling reduction in multiport antenna, but the efficiency is limited in 5.15–5.8 GHz and 2.4–2.48 GHz frequency bands.[5] The split ring resonator with the polarization diversity was designed to control the effect of mutual coupling. Although, antenna resulted in very big size of 140 × 120 mm^2.[6]

A square patch antenna with circular polarization produces more than 15 dB of isolation without any decoupling structure.[7] A parasitic element approach provides inductive effect to control mutual coupling at 5.8 GHz.[8] A multimode and multiband MIMO antenna covers 2.4–5.2 GHz and 5.2–5.8 GHz frequency band and produces envelop correlation coefficient (ECC) of 0.15 in each band.[9,10] The MIMO antenna with optoelectronic oscillator covers 2.4/5.2/5.8 GHz wireless local area network (WLAN) bands.[11] Similarly, open slot antenna with inductive and capacitive elements is used to control the mutual coupling effects between the antenna elements, and forms multiband operation.[12] MIMO antenna has also been designed for universal serial bus dongle application.[13] The monopole antennas are preferred over the irregular shaped antennas due to simplicity and easiness of design.[14,15] The aperture coupled antenna provides good radiating properties, bandwidth and impedance matching.[16] The T-shaped decoupling structure[17] and mathematically inspired MIMO antenna with polarization diversity[18] are used to achieve compactness and low mutual coupling among the radiators.

In this article, a 4-element meander line planar MIMO antenna has been proposed for wireless applications to cover 5.3–6.7 GHz WLAN band. The proposed 4 element MIMO antenna resonates at 5.8 GHz frequency, where the return loss (S_{11}) is −43.2 dB, and isolation between ports 1, 2 (S_{12})

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Effect of Ambient Temperature and Wind Speed on Performance Ratio of Polycrystalline Solar Photovoltaic Module: an Experimental Analysis

Subhash Chandra*[1], Sanjay Agrawal[#], and D.S. Chauhan*

Abstract – *Generation of electricity by clean development mechanism is the key area for researchers, many countries of the world has already shifted towards green energy. Energy is the key factor for the growth of any country. Per capita energy consumption is the significance of the progress of any nation. Recently the penetration of photovoltaic systems has increased to generate the electricity at grid or local level. Although this technology has improved a lot however the performance of these systems is site dependent, which is affected by various environmental parameters like radiation, temperature and wind. An experiment is conducted in laboratory of GLA University, Mathura, India (hot and dry climate zone of India) to emphasis especially on wind effect. Two PV modules of same electrical and mechanical specifications are taken for experiment. To conduct experiment; different months of a year from various seasons are chosen. It has been observed that increased module temperature reduces performance but the cooling mechanism provided bring down the module temperature due to which a net energy gain is 7.69% in considered time. Performance measure indices i.e. PR is improved by 7.14%.*

Keywords – ambient temperature, energy, performance ratio, photovoltaic solar cells, wind speed.

1. INTRODUCTION

In the current scenario of growing photovoltaic industry, it is essential to estimate high quality energy yield. In India the backbone of power sector is coal because it contributes maximum in power generation. India is aiming high to achieve the target of 175 GW installed renewable energy capacity by 2022 [1]. Since abundant amount of solar energy is available in India hence to supplement the target, government made a plan to generate 100 GW from solar photovoltaic systems, out of which 40 GW must be generated from rooftop solar photovoltaic systems. State-wise target of solar power is shown in Figure1 [2].

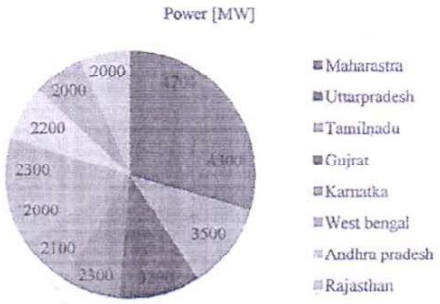

Fig. 1. State wise target of solar power.

In order to generate electricity from non-polluting energy sources, many efforts are being made to integrate different renewable energy sources However, PV systems are expected to play a key role for the sustainability of the future [3]. Harnessing of electrical energy from solar energy depends upon geographical location, site conditions, characteristics of solar cell etc. *i.e.* the performance of PV system is highly climate dependent. Many researchers have already contributed a lot to improve the efficiency, actual performance and sizing of PV system [4]. Two well-known parameters *i.e.* radiation and temperature affect the performance of PV system directly. Maximum electricity can be harnessed by maximizing radiation and minimizing temperature. Radiation is module orientation dependent and temperature depends on the semiconductor material used for manufacturing the solar cell. Although tracking methods can be used to get maximum radiation and due to limitations, they are not always beneficial. Since India is in northern hemisphere, and generally the PV modules are placed facing due south (*i.e.* equator facing), as a thumb rule the tilt angle is fixed equal to the latitude of the location to maximize the solar radiation on a tilted surface. Seasonal variation in tilt angle is beneficial for better performance of PV system but in fixed rooftop PV system the optimal tilt angle is equal to latitude [5]. Solar cells are very sensitive to temperature; their power is significantly affected by temperature. For crystalline silicon the voltage temperature coefficient is about – 0.45%/K and current temperature coefficient ranges between 0.04 to 0.09%K. Manufacturers indicate the PV module efficiency under standard test conditions (STC), temperature of module 25°C, solar radiation of 1000w/m^2 and air mass ratio AM=1.5 [6]. Large variations can be seen under outdoor conditions, therefore an important impact on efficiency and energy yield is observed. Module efficiency is temperature dependent [7]-[9]. Although a lot of literature is available on PV cell temperature, which can be assumed

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Research paper

Soft computing based approach to evaluate the performance of solar PV module considering wind effect in laboratory condition

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ABSTRACT

Energy is the key factor for the growth of any country. Per capita energy consumption is the significance of the progress of any nation. With the increasing environmental impacts, word community is searching the way to shift towards sustainable energy sources. Recently the penetration of photovoltaic systems has increased to generate the electricity at grid or local level. Although this technology has improved a lot however the performance of these systems is site dependent. The experiment is conducted in laboratory of GLA University, Mathura, UP, India (hot and dry climate zone of India). Two PV modules of same electrical and mechanical specifications are taken for experiment. To analyze actual performance; different months of a year from various seasons are chosen including artificial wind. It has been observed that increased module temperature reduces performance but the cooling mechanism provided, bring down the module temperature due to which a net energy gain is 5.07% in considered time. Performance measure indices i.e. PR is improved by 3.4%. Experimental and Simulated energy is 431.28wh and 434.98wh for cooled module while for not cooled module experimental and simulated energy is 410.44wh and 439.7wh. Simulated values of energy are closer to experimental values for cooled module hence ANN avoids the underestimation of performance and overestimation of size, average simulated PR is also same as that of experimental PR i.e. 98.6%.

1. Introduction

In the current scenario of growing photovoltaic industry, it is essential to estimate high quality energy yield. In India the backbone of power sector is coal because it contributes maximum in power generation. India is aiming high to achieve the target of 175 GW installed renewable energy capacity by 2022 (Birol, 2015). Since abundant amount of solar energy is available in India hence to supplement the target, government made a plan to generate 100 GW from solar photovoltaic systems, out of which 40 GW must be generated from roof top solar photovoltaic systems. State wise target of solar power is shown in Fig. 1 (Anon, 2017).

In order to generate electricity from non polluting energy sources, many efforts are being made to integrate different renewable energy sources However PV systems are expected to play a key role for the sustainability of the future (Yang and Yin, 2011). Harnessing of electrical energy from solar energy depends upon geographical location, site conditions, characteristics of solar cell etc. i.e. the performance of PV system is highly climate dependent. Many researchers have already contributed a lot to improve the efficiency, actual performance and sizing of PV system (Bizzarri et al., 2013; Gong and Kulkarni, 2005). Two well known parameters i.e. radiation and temperature affect the performance of PV system directly. Maximum electricity can be harnessed by maximizing radiation and minimizing temperature. Radiation is module orientation dependent and temperature depends on the semiconductor material used for manufacturing the solar cell. Although tracking methods can be used to get maximum radiation but due to limitations, they are not always beneficial. Since India is in northern hemisphere so generally the PV modules are placed facing due south (i.e. equator facing), as a thumb rule the tilt angle is fixed equal to the latitude of the location to maximize the solar radiation on a tilted surface. Seasonal variation in tilt angle is beneficial for better performance of PV system but in fixed roof top PV system the optimal tilt angle is equal to latitude (Gong and Kulkarni, 2005; Khatib et al., 2012; Dolara et al., 2012; Beringer et al., 2011; Kaldellis et al., 2012).

Solar cells are very sensitive to temperature; their power is significantly affected by temperature. For crystalline silicon the voltage temperature coefficient is about −0.45%/K and current temperature coefficient ranges between 0.04 to 0.09% K (Beringer et al., 2011). Manufacturers indicate the PV module efficiency under standard test conditions (STC), temperature of module 25 °C,

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Solar power utility sector in india: Challenges and opportunities

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https://doi.org/10.1016/j.rser.2017.06.077

Abstract

In the last decade the demand of power in India has increased manifold, therefore Government has announced the National Solar Mission of generating 100 GW of solar power up to 2022. Around 60% of the total National Solar Mission target is allotted to the national/international large-scale solar power developers/investors. Hence, it becomes important to know the ground reality of large-scale solar PV developers/investors. This paper deeply analyzes the key barriers and bottlenecks faced by solar power developers in achieving the target and their growth. This article also suggests some motivational factors of solar energy which play an important role in attracting large solar players around the world to invest in Indian subcontinent. It concludes by highlighting some key policies of the Government that can help in addressing some identified barriers in order to ensure a secured sustainable energy future of India.

An Experimental Study On Solar Water Heater Integrated With Phase Change Material

Advances in Fluid and Thermal Engineering pp 347-356 | Cite as

Conference paper

First Online: 24 April 2019

Part of the Lecture Notes in Mechanical Engineering book series (LNME)

Abstract

This paper shows the experimental investigation of the thermal performance of solar water heater coupled with phase change material (PCM) cylinder. The cylinder contains PCM and spiral copper tubes and is properly insulated using glass wool on the outer surface. The PCM in the cylinder gets charged through hot water during the day, due to the availability of solar radiation. When there is no solar radiation (during the night or during cloudy weather), the PCM discharges and transfers its thermal energy to the cold water and hence raises its temperature. Therefore, this system ensures supply of hot water when there is no solar radiation, without using any conventional form of energy. The testing is done in the laboratory, and the thermal performance of the solar water heater integrated with PCM cylinder is determined. The thermal performance of the solar water heater at different flow rates, i.e., 0.017, 0.030,

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OPTIMIZATION OF DESIGN PARAMETERS OF GO-KART

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Abstract— the objective of the design is to optimize the working and performance of go-kart considering various factors. The modeling of our Go-kart was done using CATIA V5 software. The Finite Element Analysis was analyzed by ANSYS R18.2 software. Our central idea was to focus on designing a safe and functional vehicle that could be manufactured and be capable to compete in the market. This article summarizes the advances of vehicle dynamics which includes braking system, transmission system and steering system. Some of the attributes of the vehicle dynamics related to geometric attributes, attributes based on the mass and its distribution and attributes which are tire specific are also discussed in this paper.

Keywords— **Go-kart, Finite Element Analysis, Vehicle dynamics, CATIA**

I. Introduction

Go-kart is an open wheel car powered by an I.C. engine/electric motor. It may be considered as a small prototype consisting of basic automobile components. The vehicle is required to be made with a combination of a frame and other integral parts such as steering, braking, transmission, etc. As weight serves critical in any vehicle operating on a small engine, there should be an optimum weight to power ratio. The frame has been designed accordingly ["Thavai et al. (2015) in their paper discussed about the material selection & modelling of the frame"]. Particular capabilities on basis of which the go-kart is judged includes static as well as dynamic.

The design of the go-kart focuses on the following objectives: Safety, Strength, Standardization, Cost, Driver ease, Ergonomics and Aesthetic consideration.

II. DESIGN CONSIDERATIONS AND ASTHETICS

Preliminary, several design considerations are to be defined before beginning the design of the frame and different parts. These decisions include transmission, intended steering, braking, assembly, fabrication methods. Besides these considerations the rules regarding the frame geometry, driver safety must also be considered ["Kyung G. et al. (2009) in their paper concentrated on the driver ease, working space & driving postures for ergonomic design"]. Our main aim was to design a Go kart which is cost effective, giving out low emissions, light in weight, high performing and safe and easy to fabricate as well["Gandhi et al. (2014) in their work addressed challenges related to safety, future fuels & reducing pollution in other words a smart Go-kart"]. CATIA V5 software has been utilized to model the design. Different views of the Go kart have been added here.

Figure 1: Front View of CAD Model of Go- Kart

Figure 2: Side View of CAD Model of Go- Kart

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ISSN Print: 0976-6340 and ISSN Online: 0976-6359

NUSSELT NUMBER OPTIMIZATION FOR DOUBLE PASS SOLAR AIR HEATER HAVING V-SHAPE RIBS AS ROUGHNESS ELEMENT USING GENETIC ALGORITHM

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ABSTRACT

In this era due to need, movements is being made on alternative energy fronts in areas including solar. Due to low thermal performance of solar collectors different design and techniques are implemented to increase their performance. In this work, we present genetic algorithm approach to predict the optimized set of operating parameters for double pass solar air collector with V-shape ribs as artificial roughness, so as to optimize thermal performance. The results so obtained are then compared with the experimental results. Parameters affecting heat transfer rate (thus thermal performance) and range of these parameters taken into consideration are ; Reynolds number (Re) from 4900 to 12000, attack angle (α) from 30° to 75°, relative roughness pitch (p/e) from 10 to 20 and relative roughness height (e/D_h) from 0.022 to 0.044. Genetic algorithm is used to obtain the optimized set of these parameters affecting heat transfer rate and compared with experimental results. On Comparison we get that Nusselt number (Nu) is 1.07 times to that of experimental one.

Key words: Optimization, Artificial roughness, heat transfer, Solar Energy, Genetic algorithm.

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http://www.iaeme.com/IJMET/issues.asp?JType=IJMET&VType=9&IType=13

Energy Strategy Reviews
Volume 22, November 2018, Pages 385-395

Perspectives of solar photovoltaic water pumping for irrigation in India

Pushpendra Kumar Singh Rathore [a, b], Shyam Sunder Das [b], Durg Singh Chauhan [a]

https://doi.org/10.1016/j.esr.2018.10.009

Highlights

- Government policies and support system for the growth of SPVWP in India.
- Opportunities in India for the development of the SPVWP.
- Socio-economic impact and challenges of SPVWP.
- A policy framework to enable implementation at large scale.

Abstract

Due to the continuous increase in the use of fossil fuel, India and the world are

Solar Energy

Volume 176, December 2018, Pages 709-724

Review

An evaluative observation on impact of optical properties of nanofluids in performance of photo-thermal concentrating systems

Sujit Kumar Verma [a], Arun Kumar Tiwari [b], Mukesh Tripathi [c]

Show more

https://doi.org/10.1016/j.solener.2018.10.084

Abstract

Present crisp and brief review is specifically focused on mechanism and role of optical properties of nano material in enhancement of absorptance or extinction coefficients from solar spectrum. By proper selection of size and shape along with optimum concentration, optimum absorptance can be achieved. This systematic study provides valuable information about various key nanomaterials and base fluids which are more specific in band splitting of spectrum, tunable to size, shape and particle volume concentration on optical properties. Based on simulation model and experimental observations performed by researchers, it is inferred that optical properties of nanofluids are function of type of material, size and shape. Base fluids also have influence on optical absorptance but it is a constant variable. By appropriate selection, morphological design of particle, efficient and suitable environment (design aspect of system)

Title:	Molecular Dynamics Simulation of Glass Transition Behavior of Polymer based Nanocomposites
Authors:	Singh, P K (/browse?type=author&value=Singh%2C+P+K) Sharma, K (/browse?type=author&value=Sharma%2C+K)
Keywords:	Glass Transition Temperature;Functionalized Graphene;Epoxy Resin;Molecular Dynamics Simulation
Issue Date:	Oct-2018
Publisher:	NISCAIR-CSIR, India
Abstract:	Molecular Dynamics (MD) simulations were carried out to explore the effect of functionalization of graphene on the visco-elastic properties of epoxy based nanocomposites. Pristine graphene, graphene functionalized with amine ($-NH_2$) group and carboxyl ($-COOH$) group respectively involved in this research. The simulation result shows that glass transition temperature (T_g) of the graphene epoxy based nanocomposites are higher than that of pure epoxy. The computational findings of T_g agrees well with the experimental results. Thus, the present MD simulation study can serve as good computational evidence for the existing experimental results on the T_g of graphene epoxy composites.
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URI:	http://nopr.niscair.res.in/handle/123456789/45110 (http://nopr.niscair.res.in/handle/123456789/45110)
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Appears in Collections:	JSIR Vol.77(10) [October 2018] (/handle/123456789/45106)

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File	Description	Size	Format

Journal of Heat Transfer

RESEARCH-ARTICLE

Experimental Study of Thermal Performance of Nanofluid-Filled and Nanoparticles-Coated Mesh Wick Heat Pipes

Naveen Kumar Gupta, Arun Kumar Tiwari, Subrata Kumar Ghosh

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Paper No: HT-17-1598 https://doi.org/10.1115/1.4040146
Published Online: June 7, 2018 Article history

The enhancements in thermal performance of mesh wick heat pipe (HP) using TiO_2/H_2O nanofluid (0.5, 1.0, and 1.5 vol %) as working fluid for different (50, 100, and 150 W) power input were investigated. Results showed maximum 17.2% reduction in thermal resistance and maximum 13.4% enhancement in thermal efficiency of HP using 1.0 vol % nanofluid as compared to water. The wick surface of the HP was then coated with TiO_2 nanoparticles by physical vapor deposition method. The experimental investigation had been also carried out on coated wick HP using water as working fluid. Results showed 12.1% reduction in thermal resistance and 11.9%

Article

Experimental investigation of thermal performance of mesh wick heat pipe

January 2018 · Heat Transfer Research 49(18)
DOI:10.1615/HeatTransRes.2018024361

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Subrata Kumar Ghosh
Indian Institute of Technology (ISM) Dhanbad

Citations (9) References (14)

Abstract

In this article, the results obtained from a detailed experimental investigation of the thermal performance of mesh wick heat pipe are presented. The effects of heat input, inclination angle, and the volume of the working fluid on the thermal performance of the heat pipe were investigated. Experimental investigations were carried out over a wide range of heat input (50-150 W), diff erent inclination angles (0°, 15°, 30°, 45°, and 60°), and volumes of the working fluid (20 mL, 25 mL, 30 mL, and 35 mL). The results show that the thermal performance of the heat pipe increases with increase in the heat input until the dryout condition is achieved. The heat pipe achieved the maximum thermal effi ciency of 69% at 150 W heat input, 30° inclination angle, and charged with 35 mL of working fluid. The authors highlight the diff erent causes responsible for the enhancement in the thermal performance of the heat pipe.

No full-text available

Citations (9) References (14)

... Latent heat thermal storage system has high thermal storage density with solid-liquid phase change and they can store thermal energy at a constant temperature with respect to the phase change temperature of TES substance. [29] [30][31] The materials which can melt and solidify at particular temperature and also capable for storing and releasing huge amount of heat consistently by undergoing a phase transition are called phase change materials. [3,14,16,[23][24][25][26] PCM is a very good option for LHTS because of its high TES density and isothermal behaviour during charging and discharging. ...

A Review on Augmentation in Thermal Performance of Solar Water Heater using Phase Change Material

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OPTIMIZATION OF NUSSELT NUMBER FOR INCLINED RIBS USED AS ROUGHNESS ELEMENT IN SOLAR AIR HEATER DUCT

Gaurav Bharadwaj, Harish Sharma, Avdhesh Sharma and Piyush Singal
Department of Mechanical Engineering, GLA University, Mathura, India

ABSTRACT

These days, the interest of researcher growing in the field of optimization of solar systems in order to improve the heat transfer rate by reducing friction losses either using optimization techniques or improving system design by introducing roughness elements. In this work, Genetic algorithm has been implemented to optimize the value of heat transfer and the same is compared with the experimental result of flat plate solar air heater and predict the optimized set of design and operating parameter. The operating parameters which affect the heat transfer rate are relative roughness pitch (p/e) from 8 to 16, relative roughness height (e/D_h) from 0.021 to 0.043, angle of attack (α) from 30° to 75° and Reynold number (Re) from 5600 to 28000. The optimized set of these parameters are obtained and compared with experimental result which shows that Nusselt number is 1.23 times as compare to that of experimental one.

Nomenclature:

p/e: relative roughness Pitch

e/D_h: relative roughness height

α: Angle of Attack

Re: Reynolds number

Nu: Nusselt number

f: friction factor

Key Words: Optimization, Roughness element, heat transfer rate, Solar Energy

Cite this Article: Gaurav Bharadwaj, Harish Sharma, Avdhesh Sharma and Piyush Singal, Optimization of Nusselt Number for Inclined Ribs used as Roughness Element in Solar Air Heater Duct, *International Journal of Mechanical Engineering and Technology (IJMET)*, 9(11), 2018, pp. 2272–2276.
http://www.iaeme.com/IJMET/issues.asp?JType=IJMET&VType=9&IType=11

1. INTRODUCTION

In the present situation, the country's improvement and advance in expectation for everyday comforts are assessed by per capita vitality utilization because of which quick exhaustion of traditional sources, henceforth for nonstop and solid supply of vitality substitute vitality assets

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EFFECT OF TOOL GEOMETRY OF FRICTION STIR WELDING ON MECHANICAL PROPERTIES OF AA-7075 ALUMINUM ALLOY

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ABSTRACT

In this research experiments an attempt has been made to analyze the result of mechanical properties as well as studying the effect of welding parameters like welding speed, pin diameter and shoulder diameter for friction stir welding (FSW). FSW is the most suitable methods for welding on aluminum alloy material AA7075-T6. The mechanical properties like bending strength and tensile strength of weld join is increasing with rotational speed and decreasing at constant transverse feed. The results indicated that tensile strength and micro hardness is increasing at shoulder diameter of 20 mm (ratio 1:4) and at 1320 rpm with a feeding round of 40 mm/min.

Keywords: Aluminum alloys; Rotation speed; Tool geometry; Impact Bend; Micro Hardness.
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1. INTRODUCTION

The friction stir welding (FSW) technique firstly was developed by The Welding Institute (TWI) of UK in 1991. It is a new solid phase technique to join two similar and dissimilar aluminum alloy material [1-2] in an effective way. In FSW, a non-consumable rotation tool with a specially designated pin and a shoulder is inserted into work piece (plates or sheets edges) at various speeds. The shoulder of tool contacts with the top surface of work pieces at a high speed and traverse along the line of joints which results weld joint. In the consequence of this procedure a joint is produced in solid state. High strength aluminum alloy use in automobile, aircraft and aerospace because of their excellent strength. So, FSW process can be considered as the most efficient way to join the aluminum alloy material. Lower processing temperatures along with better efficiency make it a very demandable and robust technique for joining two facing work pieces. During FSW process precipitation-hardened aluminum alloys, it is usually reported that the heat-affected zone (HAZ) and low hardness zone (LHZ) are developed due to significant coarsening of the precipitate. AA 7075-T6 alloys have high strength materials for structural applications in aerospace field [3-5].

Solar Energy

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Performance analysis of hybrid nanofluids in flat plate solar collector as an advanced working fluid

Sujit Kumar Verma [a], Arun Kumar Tiwari [b], Sandeep Tiwari [c], Durg Singh Chauhan [a]

Show more

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Abstract

Nanofluids are innovative fluids. Hybrid fluids are engineered by mixing of different nanoparticles in suitable proportion with conventional fluid, in order to achieve desired thermo physical parameters. In present work, authors have investigated response of flat plate solar collector when conventional working fluid, water is replaced by nanofluids. The selected nanofluids are hybrid of CuO and MgO with MWCNTs with water base. Experimentation performed under varying concentration from 0.25% to 2.0% and varying flow rate (0.5 lpm to 2.0 lpm) for both nanofluids under given ambient condition. Quantitative and qualitative responses of flat plate collector have been observed by energetic and exergetic performance evaluation of the collector. Increase of Bejan number is an indication of system's quality credit. It enhances productive entropy due to transfer of heat caused by temperature difference and suppresses production of entropy, arises by systems irreversibilities. Findings strongly supports optimum operating conditions for flat plate solar collector are concentration of

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STUDY OF FRICTION STIR WELDING- A REVIEW

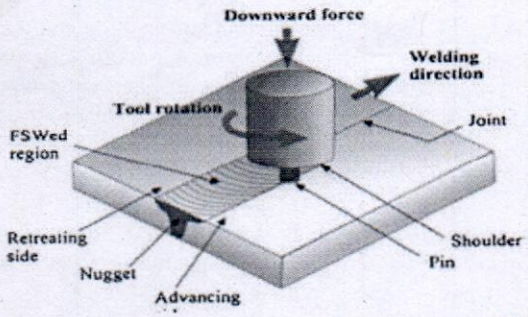
Shahabuddin[1] & V.K Dwivedi[2]

Abstract-Friction stir welding is a newer solid state welding method which is usually applied for the different grades of different ferrous and non- ferrous materials. In this review paper, various research papers are studied and discussed. It has been trying to understand the joining of aluminum alloys and other different materials under different welding conditions. Friction stir welding plays a vital role to get the defect free welds. In this paper, different friction stir welding process parameters and their effect on mechanical and microstructural properties of the joints are also summarized.

Keywords: Aluminum alloys, Rotation speed, Tool geometry, Mechanical properties, Microstructures, friction stir welding (FSW), Fixture.

1. INTRODUCTION

Friction Stir Welding (FSW) is a latest method of bonding of two similar dissimilar metal which was developed by Wayne Thomas at The Welding Institute (TWI), UK, in 1991 [1]. Friction stir welding is also called a solid-state joining operation of two light-weight metals with lower melting point in such way that increased tensile strength of the weld joints with increasing friction time and on average highest strength could reach up to 101MPa when friction time was 5 s. All the friction welded joints failed at the friction interface in tensile test. Friction stir welding is quickly received the attention of many researchers around the world traditional, FSW process performed a joint by a rotational tool which is inserted into works pieces to be joint and moved beside the weld joint.



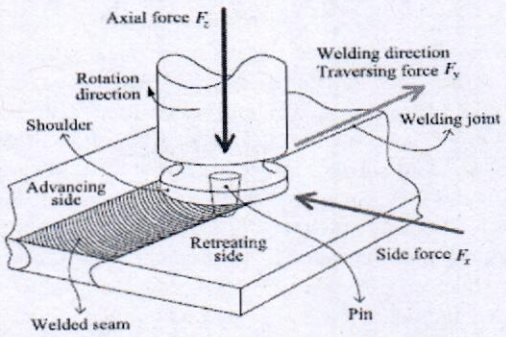


Fig1. Schematic drawing of FSW process [2] Fig2. Schematic drawing of FSW process [3]

In unlike fusion welding, FSW does not melt the material which is require a consumables electrode like a filler rod, shielding gas and uses less energy to make the weld joint [4]. Govindaraj Elatharasan et al observed (FSW) process with a cylindrical tool which contain pin and shoulder and tool parameters are also play an important role in determining joint's characteristics. The friction stir welding process makes a plastic flow and frictional heat so that it may be regarded as mechanical process. FSW welding is a continuous process to join the two metals by a non- consumable rotating tool on base materials. [5].Most of literatures is focusing effect on mechanical properties and different tool shapes and rotational speed by using friction stir welding. Therefore, in this study, it has been tried to understand the tool shapes and parameters play an important role to determine tensile strength of weld joints by friction stir welding [6][7].

2. WORK DONE

Some of the researches are discussed here. Li H, MacKenzie D and Hamilton R studied on tool variation effect in a tool parameters, like as the diameter of tool shoulder and pin angles etc., on the FSW method for (AA2024) [9]. The diameter of a tool shoulder is designed for principle of maximum utilization torque for fraction and find out mechanical properties of joint [10]. Li H et al investigated numerically tool variation effect in tool geometry parameters, such as the tool angles etc., for the FSW operation method on AA2024 [11]. Jamshidi Aval et al investigated numerically and experimentally for altering the tool shape variables on thermo-mechanical characteristics of AA5086 in the friction stir welding [12, 13]. Some parameters are require to make the joint such as temperatures, traverse force and stresses on the work piece during FSW, tool variations

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Fabrication and Design of Fixture with a New Technique for Friction Stir Welding

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ABSTRACT

Friction Stir Welding is a new technique in which the non- consumable tool are used to performed the welding joint and heat produced due to the rotating tool over the surface of the work pieces. Friction stir welding is widely manufactured with specified fixture having good clamping capacity, compressive strength, heat resistance of the base plate, flexibility weld plate and easy to operate in FSW process. In this paper above mentioned fixture are calculated properly with complete dimensions and design criteria to fulfill requirements on certain parameters.

Keyword: Friction stir welding, Base plate, Clamping toggles, Stoppers, Clamp plate , Side plates, Fixture.

1. INTRODUCTION

The friction stir welding (FSW) process developed by the Welding Institute (TWI) of UK in 1991 is a novel solid-state joining technology that has broad applications in joining aluminum alloys difficult to weld by conventional fusion processes [1]. Friction stir welding is a solid state joining process in which non-consumable cylindrical tool transverse along the joint between two clamped pieces of butted material. Heat is generated between the tool and work pieces due to the rotating tool and weld joint produced by mechanical mixing of the material causes to soften without melting, where clamping force assist forged consolidation of the weld. Friction stir welding are currently used in aerospace vehicle very large sheets due to their exceptional strength and stiffness-to-density ratios. Considering effort has been expended to develop essay operate fixture as well as welding process.

2. FIXTURE DESIGN

Fixture is playing an important role in FSW process. It is rigidly fixed on the machine table with help of different claps during welding process. Plates may get separated due to the force arising during welding so fixture our need and best design. It is considering all the required flexibility of FSW welding. The main function of the fixture in FSW process to avoid the distortion and position of the work piece during the welding and also withstand complete side force and high temperature [2]. Production of a quality FSW Joint to needs a good selection of the appropriate fixture material for a specific application. Thus, it is has good tensile strength to withstand axial load during the FSW process [3]. It is considering all the required flexibility of FSW welding process. Fixture should withstand high temperature itself during FSW process and reduces the chances of distortion of welding joint, welding plate should not shift during FSW welding from initial position by using fixture as clamping device, it means it can withstand complete side force [4].

Components of fixture

1. Base plates
2. Stoppers
3. Side plates
4. Clamping toggles

5-Top slider clamper

Journal of Alloys and Compounds
Volume 741, 15 April 2018, Pages 281-292

Hot deformation behavior of Zr-1Nb alloy in two-phase region –microstructure and mechanical properties

K.K. Saxena [a, d], K.S. Suresh [a], R.V. Kulkarni [b], K.V. Mani Krishna [c], V. Pancholi [a], D. Srivastava [c]

https://doi.org/10.1016/j.jallcom.2018.01.008

Highlights

- Mechanical properties of hot compresses samples were calculated using small punch test.
- Microstructure was characterized by the size α, prior β grain size and texture developed.
- Yield load and maximum load was found maximum for sample deformed at 815 °C/1 s^{-1}.
- Maximum values are due to combined effect of higher dislocation density and finer α lath size.

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Research Article

Mechanical and Viscoelastic Properties of In-situ Amine Functionalized Multiple Layer Grpahene /epoxy Nanocomposites

Author(s): Pradeep Kumar Singh* and Kamal Sharma*

Volume 14 , Issue 3 , 2018

Page: [252 - 262] **Pages:** 11

DOI: 10.2174/1573413714666171220144549

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Abstract

Introduction: Graphene is flat monolayer of carbon atoms (one atom thick), covalently bonded to three other atoms in tightly packed two-dimensional (2D) hexagonal single layer stable crystalline honeycomb lattice structure. In this paper, In-situ amine functionalized exfoliated graphene with multiple layers (3-6) with low defect contents and average aspect ratio upto 10 microns (average X and Y dimensions) and thickness upto 2-3 nm (average Z-direction) which have been produced with the combined effort of chemical vapor deposition (CVD) and chemical graphite exfoliation method.

Experimental Thermal and Fluid Science
Volume 90, January 2018, Pages 84-100

Heat transfer mechanisms in heat pipes using nanofluids – A review

Naveen Kumar Gupta [a], Arun Kumar Tiwari [a], Subrata Kumar Ghosh [b]

Show more

https://doi.org/10.1016/j.expthermflusci.2017.08.013

Highlights

- Authors have summarized research outcomes of recent experimental and numerical studies.
- Provide an overview of heat transfer mechanism in heat pipes with nanofluids.
- Identified the most accepted heat transfer mechanisms.
- Research gap has been identified and suggested direction for future work.

Abstract

Conference Paper PDF Available

Modeling of Industrial supply networks to make them more effective by handling disruptions and uncertainties using MATLAB

April 2018

Conference: Conference on Mechanical Engineering & Technology...Imagination Implementation Innovation · At: Mechanical Engineering Society, Department of Mechanical Engineering Indian Institute of Technology, (Banaras Hindu University) Varanasi, INDIA.

Authors:

Rajkumar Sharma
GLA University

Piyush Singhal
GLA University

Abstract and Figures

In ever changing world supply networks are found to be having the utmost aim to meet customer's demand at the earliest with the optimum network cost. This aim seems to be difficult to obtain because of unavoidable delays and uncertainties in supply chain such as delay in transportation/production, uncertainty in transportation/production, damaging of the product in storage/ transportation, cancelation of backorders, etc. Nowadays, the spans of the networks have been extended to each and every corner of the world. This requires an approach to deal with supply chain complexities and taking appropriate decisions to manage adverse effects of supply chain disruptions. It is evident that researchers address the supply chain disruption issues by using different methodologies such as fuzzy logic, neural networks, genetic algorithm, hybrid (neuro-fuzzy) etc but the risk propensity and its dynamic nature is not appropriately addressed. In this paper an attempt has been made to address uncertainties and delays relevant to food and beverages industries using model predictive control. It is noticed that supply chains architecture can be modeled using eight possible configurations. Step & Impulse response shows possibility to meet all the demands with fewer inventories at different echelons of the network under unseen and unavoidable circumstances. The paper provides an expert system for supply chain managers for taking appropriate decisions at right time at different instances which in turn results in efficient running of supply chains.

: Mathematics of Prediction and…

Fig7. MPC Controller (a)…

Impulse response of SNSP model…

International Journal of Engineering and Advanced Technology (IJEAT)
ISSN: 2249 – 8958, Volume-7, Issue-COMET, April 2018

Synthesis and Dynamic Mechanical Analysis of Hybrid Reinforced Polymer Nano-Composites

Alok Soni, Pankaj Sonia

Abstract: *The reinforcement of nano-particles is much better than macro range particles on the basis of mechanical property of polymer composite. Some researchers work with single category nano-particle and some used more than two or hybrid composition. Nano-particles are reinforced by weight percents and at random orientations to see the effect of reinforcement on hybrid polymer matrix. The present study of this research is to see combine result of two type Alumina profile nano-particles polymer with epoxy resin; which is prepared of hybrid polymer nano-composite matrix as per in-situ polymerization technique. In-situ techniques contain whole processes to fabricate the hybrid composite. Al2O3 particles have been used to reinforce in epoxy resin with different weight percentage of 0.25%, 0.5% and 1% and made hybrid polymer composite. DMA (Dynamic Mechanical Analysis) for 3 point bending testing for microscopic structure analysis is done.*

Keywords: *DMA (Dynamic Mechanical Analysis)*

I. INTRODUCTION

Over few last decades engineering materials as ceramic, polymer, composites have been rapidly grow. These composite materials having wide area of applications to developed fast & make branch in market. The composite material have many materials leads to use in refine application [1]. The mechanical vision growing in bringing resources, on which special types of experiment had made. The combine of two or more materials of dissimilar properties, whose combination produces, combined properties that are better in several ways, to its individual constituents. A new material with combination of two or more filler can provide enhanced properties that produce a synergetic effect [2]. In composite materials, there are two constituent one is matrix and other is reinforcement. The constituents which is continuous and present in greater quantity is called matrix. The function of the matrix is to hold or bind the nano-particles together, distribute the load evenly between the particles. Protect the nano-particles from mechanical and environmental damage and also bring interlaminar shear. While the further constituent is reinforcement; its major objective is to increase the mechanical properties e.g. stiffness, strength etc. The mechanical property mainly based on the shape, size and magnitude of reinforcement [2]. As per Berghezan [4] designed of the composite material in such a way that the individual component retain their characteristic are so built-in that the composite take advantage of their greater properties without compromise on the weakness of either. The matrix material can be metallic, polymeric or can even be ceramic.

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There are basically three major types of composite materials as per the matrix material available designated. When the mixture is a polymer, the composite is called polymer matrix composite.

The Al2O3 nanoparticles have phase steadiness, high rigidity, and good dimensional constancy in dispersion in water. It can be commonly used in plastics, rubber, ceramics, and refractory products. In particular, it can significantly improve ceramics, smoothness, thermal fatigue resistance, fracture toughness, density, creep resistance and polymer products wear resistance. Also Al2O3 nanoparticles water dispersion is a capable material of extreme infrared discharge, as the far infrared discharge and thermal insulation materials are use in chemical character products and high pressure sodium lamp.

II. RAW MATERIALS USED

2.1. Alumina Nano-Particles:

Aluminum oxide is a chemical compound of aluminum and oxygen with the chemical formula, Al2O3 commonly called Alumina and It Is in Powder Form. There are hybridization matrix of two Al2O3 nano-particles i.e. 1)rod shape 2) spherical shape , the Rod shape particle have diameter 5-10 nm and length 50 nm, on the other hand spherical shape having diameter 14-27 nm. Both shape alumina particles provided by Sigma Aldrich India. Particles authentication TEM image received from Sigma Aldrich. Individually spherical and rod particles shape authentication show in figure 1.1 & 1.2 respectively [20].

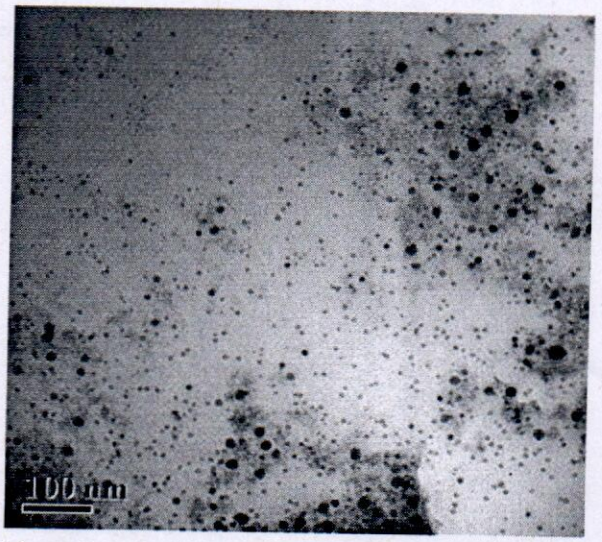

Figure 1.1: Alumina Nano Spherical Particles at 1 wt% in Epoxy.

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Experimental Investigation for Optimization of Process Parameters of EDM for Titanium Grade 5 Alloy [TI6AL4V] using Taguchi Method and Promethee Method

Avdhesh Kumar Sharma, Gaurav Bhardwaj, Bharat Singh

Abstract. *The Electrical Discharge Machining (EDM) is one of the most common and most accepted non-traditional machining process used. The work-piece material selected in this experiment is Titanium Grade 5 Alloy [Ti6Al4V] taking in to account its wide usage in industrial application. The high strength and stiffness of Titanium Grade 5 Alloy leads to improve tensile shear and flexural properties. The variable parameters are peak current, pulse on time, and pulse off time and gap voltage. On the basis of PROMETHEE matrix and TOPSIS (Technique for Order Preference by Similarity to Ideal Solution) methodologies for four factors with three levels of each factor, we have selected L9. ARRAY for DOE (Design of Experiments) to be carried out for knowing the TWR and MRR the effect of the variable parameters mentioned above upon machining characteristics such as MRR and TWR is studied and investigated. The tool material is COPPER CADMIUM.*

Keywords: *Electric Discharge Machining, Tool Wear Rate, Material Removal Rate, Peak Current, Flushing Pressure.*

I. INTRODUCTION

Electrical Discharge Machine (EDM) has now turned into the most critical acknowledged innovation in assembling businesses since numerous mind boggling 3D shapes can be machined utilizing a straightforward molded instrument terminal.

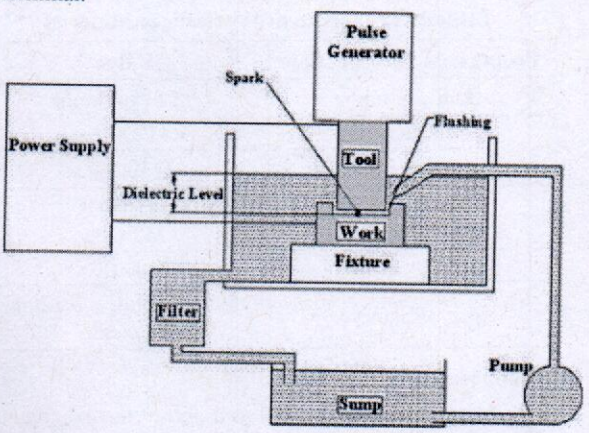

Figure1: Concept of the EDM

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EDM is a vital "non-customary assembling technique", created in late 1940s and has been acknowledged worldwide as a standard handling production of forming tools to deliver plastic moldings, die casting, forging dies and so forth. Customary machining methods regularly in view of the material removal, utilizing tool material harder than the work material and can't machine them financially. An EDM depends on the dissolving impact of an electric spark on both the terminal utilized. EDM really is a procedure of using the evacuation phenomenon of electrical-discharge in the electric. Consequently, the cathode and anode assumes an essential part, which influences the material removal rate (MRR) and the tool wear rate (TWR) which are the fundamental yield parameter of EDM. Figure 1 demonstrates the mechanical setup and electrical setup and electrical circuit for electro discharge machining. A thin slit around 0.025mm is keep up between the device and work-piece by a servo framework appeared in figure. Both tool and work-piece are submerged in a dielectric liquid. Kerosene oil/EDM oil is extremely basic kind of fluid dielectric albeit gaseous dielectrics can likewise be utilized in certain cases. The tool acts as cathode and work-piece acts as anode. Voltage in form of a spark discharge through the gap, when sufficient enough in a time interval of 10 micro seconds. Because of heat the positive ions and electrons produce a conductive discharge channel. It is exactly now when the spark hops causing crashes amongst particles and electrons and making a channel of plasma. A sudden drop of the electric protection of the past channel enables current thickness to achieve high esteems creating an expansion of ionization and the sure of an effective magnetic field. The minute spark happens adequately pressure is produced amongst work and tool because of which a high temperature is come to and at such high pressure and temperature some piece of metal is liquefy and disintegrated. Such restricted outrageous ascent in temperature prompts material evacuation. Material expulsion happens because of case vaporization of the material and additionally because of melting. The liquid metal isn't evacuated totally yet just mostly.

II. LITERATURE SURVEY

The intensity and pulse time factor were the most critical if there should arise an occurrence of SR, while the duty cycle factor was not noteworthy by any means.

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Article PDF Available

Multiobjective Optimization of Submerged Arc Welding Parameters on AISI 5130 Alloy Steel using Taguchi Method

May 2018

Authors:


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Avdhesh Sharma
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Abstract

Submerged Arc Welding (SAW) is considered as a multi-input process. In order to achieve high productivity and quality of weld, it is very difficult to select optimum combination of input process parameters. In this work Taguchi Method is being used for the optimization of input process parameter, which is very simple, fast, robust and convenient. Submerged arc welding (SAW) is a process of overlaying metals by coalescence. The heat required for coalescence is provided by an arc generated between consumable electrode and work-piece. Analysis of SAW process parameter is key point for researcher due to its wide application in heavy welding industry, ship construction, pipeline etc. To set the optimum process parameter is a common problem with SAW for desired response due to its multi input parameter. These parameter are welding current, arc voltage, welding speed, wire feed rate etc. Later response found by the process significantly influence by these parameter. In this work, Submerged Arc Welding is performed on AISI 5130 alloy steel. Responses in terms of depth of penetration and Hardness of welded joint are analyzed. Based on optimization a regression model has been developed for each response. Optimum levels of factors have been identified. The predicted value of levels has been validated by experimental run.

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Correlations Development for Nusselt Number and Friction Factor of Roughened Double Pass Solar Air Heater Duct

Gaurav Bharadwaj, Vikas Sharma, Avdhesh Sharma

Abstract: *An experiential study has been executed to see the otcome of using inclined and transverse ribs as roughness elements on the Nusselt number and friction features on absorber plate in the rectangular duct used in DPSH. Width to duct height proportion (w/h) is 10, relative roughness pitch (p/e) varies from 5-20, relative roughness height (e/D_h) varies from 0.043, attack angle (α) varies from 30°-90° and Reynolds number lies between 4000-18000. The comparision of heat transfer and friction factor of roughened duct and smooth duct has been shown. A appreciable rise in the Nusselt number and friction factor has been noticed as that of smooth duct. Nusselt number and friction factor correlations have been developed using the experimental data*

Index Terms: *Nusselt Number; Friction Factor; Solar Air Heater Duct; Ribs.*

I. INTRODUCTION

Low heat transfer rate between the collector plate and the air streaming inside solar air heater channel lower down its efficiency. Also they have low specific heat. These shortcomings are being minimized by providing artificial roughness over the absorber plate to a greater extent. It enhances both the Nusselt number and friction factor to a considerable extent. This method of enhancing heat transfer and friction factor characteristics as artificial roughness on the absorber plate have not been used in double pass solar air heater till now. Artificial roughness can be provided by machining, sand blasting, by providing dimples and fixing ribs etc. as given by Dippery and Sabersky [1], Saini and Saini [2], Leung et al. [3], Burgess et al. [4], Bhushan and Singh [5]. The design of double pass reverse ebb air heater is firstly given by Satunanathan and Deonarine [6]. They flows air firstly between the gap between absorber plate and glass cover and then sent it to the duct. They found that the thermic fall from one or more cover glasses can overcome by using such structures. These types of DPSH are 10-15% more efficient than the single pass solar air heater.

N.E.Wijeysundera et al. [7] executed the thermic performance of two-pass solar heaters. He found that DPSH are 10 to 15% efficient than traditional solar collector.
Momin et al. [8] worked over rugged solar air heater channel. They found that increment in the Reynolds number increase the Nusselt number and visa versa for friction factor. They noticed that the Nusselt number rises 2.30 times and Friction factor rises 2.83 times as compared to smooth collector plate for an angle of attack of 60°. A.P.Omojaro and L.B.Y.Aldabbagh [9] have investigated the experimental performance of single and DPSH with fins and steel wire mesh as absorber. They found that by using wire mesh as an absorber plate the thermal performance of single and DPSH increases when the mass flow rate increases from 0.012 kg/s to 0.038 kg/s. They also found that the maximum thermic performance is 59.62% and 63.74% for both single pass and DPSH respectively.

Prashant et al. [10] carried out the analytical study of performance of a novel parallel ebb filled bed solar air heater. They design analytical model describing various temperature and heat transfer characteristics. They found that filled bed solar air heater always gives more efficiency as compare to the convenctional non porous DPSH.

M.F.El-khawajah et al. [11] investigated the outcome of cross fins on a DPSH (Double pass solar air heater) using wire net as a collector plate. He investigated thermal performance with 2, 4 and 6 fins attached. They found that performance rises with increasing mass flow rate for the range of 0.0121-0.042 kg/s. The maximum performance found to be 75%, 82.1% and85.9% respectively for 2, 4, 6 fins attached for the same mass flow rate of 0.042 kg/s.

Maithani and Saini [12] investigated the effect of V-ribs with symmetrical gaps on the collector plate of DPSH. They investigate the augmentation in the Nusselt number and friction factor are 3.6 times and 3.67 times respectively. They also develop the correlation for the same. Sharma et al. [13], [14] investigated the enhancement in the friction factor and the Nusselt number by placing V ribs on absorber plate of DPSH. The correlation for the Nusselt number and friction factor have also developed by them.

The present experiential investigation executed to see the outcome of inclined and transverse ribs on the Nusselt number and friction factor used in rectangular duct of a double pass solar air heater as artificial roughness on the absorber plate, as none of the studies is being carried out over double pass solar air heater. The experimental data has been collected and used for the development of heat transfer and friction factor correlations.

II. EXPERIMENTAL SETUP

A schematic view of the experimental set-up has been shown in Figure 1.

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CFD ANALYSIS OF FREE SURFACE FLOW OVER BROAD-CRESTED WEIR USING VOLUME OF FLUID METHOD

Prashant Dixit

Conference Paper | PDF Available

Thermo-physical characterization of Jatropha- based Biodiesel

March 2018
Conference: Thermo-physical characterization of Jatropha-based Biodiesel · At: Indian Institute of Technology (BHU) Varanasi
Project: Thermo-physical characterization of jatropha based biodiesel

Authors:


Rishabh Chhirolya
GLA University


Rajkumar Sharma
GLA University


Piyush Singhal
GLA University

References (7) Figures (3)

Abstract and Figures

The aim of this research paper is to characterize the thermo-physical properties of Jatropha-based bio-diesel. As we all aware that, the petroleum products are limited on earth so there is a requirement to replace petroleum products with a new type of fuel as biodiesel. The Jatropha-based biodiesel has many properties to replace the diesel. Researchers are now engaged in searching of such bio-diesels. Jatropha-based biodiesel has potential to fulfill the future energy demands because agricultural land of India is most suitable for the production of Jatropha trees. Jatropha crop can be easily cultivated in infertile soil and can be harvested in any season. Our farmer can also be trained for efficient production of this crop. Different experiments are performed for Transesterification of Jatropha (Ratanjyoti) during this process. The properties like viscosity, density are determined through Brookfield digital Viscometer. In these experiments a proper mixture of Potassium hydroxide(KOH) and Ethanol(C2H5OH) in a pre-decided contain ratios mixed with Jatropha oil and heated up to 70 0 C for 4 hours. After this process, the solution is left for solidification for two days. Finally we get Jatropha-based bio-diesel and Glycerin as a by-product from the solution. The experiments are performed in the laboratory of Pharmacy Department at GLA University, Mathura. Results obtained after Transesterification of Jatropha oil are tabulated and compared with diesel. It was found that properties of bio-diesel are approximately similar to diesel and are also superior to diesel in some aspects.

: :Viscosity after Transesterificati… : Comparison of Density for…

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Multi- Optimization of Surface Roughness & Material Removal Rate of D3 Tool Steel While Wet Turning Using Multi-Criterion Decision Making Methods

Vikas Sharma, Joy Prakash Misra

Abstract: *The objective of the paper is to obtain an optimal setting of turning process parameters (cutting speed, feed rate and depth of cut) resulting in an optimal value of the surface roughness and material removal rate while turning D3 tool steel TiC-coated tungsten carbide tool under wet condition. Taguchi L9 array has been used to design the experiments, the results are further analyzed using MCDM techniques named Technique for order preference by similarity to ideal solution TOPSIS and Preference Ranking Organization Method for Enrichment of Evaluations (PROMETHEE) to investigate the multi-optimization of response characteristics of D3 tool steel bars.*

Index Terms: *TOPSIS, PROMETHEE, TAGUCHI, DOE*

I. INTRODUCTION

Mostly the machining parameters are selected based on the knowledge, labour expertise and also referring to standard handbooks. The chosen machining parameters may not be the optimal solution which leads to higher cost of the product[1] .High machining performance is obtained by the selection of optimum machining parameters. Optimization techniques help as to select the optimum combination of machining parameters [2] Production hubs around the world looking for lower cost solutions with reduced lead time and better surface quality in order to maintain their competitiveness. Traditionally, most ferrous metal parts are rough turned, heat-treated and finished by abrasion [3]. In recent years, hard turning which uses a single point cutting tool has replaced grinding to some extent for such applications D3 tool steel is one of the widely used materials due to its high and unique strength that is maintained at elevated temperature and its exceptional wear resistance. It is suitable for manufacturing of cold work dies and rolls.D3 steel possessing high strength and toughness in range of HRC 60 and above is usually known to create major challenges during machining. Turning is traditional machining method that could be cost effective method of machining of D3 tool steel[4]. However there is not much evidence regarding turning of material like tool steel in literature. Ravinder et al; worked on AISI O3 steel in order to optimize the parameter for surface roughness and material removal rate and compared the different method for multi optimize the output parameter, they found the WSN method best for multi optimize the input parameters[5]. Chaudhari et al; worked on mild steel using L9 orthogonal array with output parameter surface roughness and tool wear under the environment of MQL(minimum quantity lubrication). The experimental result showed that the cutting speed, feed rate and depth of cut are the main parameters that can effect the tool wear. They also showed that MQL provides solution for many problem during turning. Thamizhmanii et al; applied Taguchi method for finding out the optimum cutting conditions for surface roughness in turning SCM 440 alloy steel using speed, depth of cut and feed rate. The experiments were with the accordance of L18 orthogonal array and results were analyzed with the help of ANOVA (Analysis of Variance) method. The work revealed that depth of cut was significant factor which contributed to the surface roughness[6]. Sahoo and Sahoo Paper presents the experimental study, formation of mathematical model and input factors optimization for surface roughness in turning D2 steel using TiN coated carbide insert using Taguchi parameter design and response surface methodology. The experiments were conducted with the help of L27 OA taking work-piece speed , feed and depth of cut cutting parameters. The influence of the machining parameters on the surface finish has also been investigated and the optimum cutting condition for minimizing the surface roughness is evaluated. Result shows that feed the most significant process parameter on surface roughness followed by depth of cut. The cutting speed is found to be insignificant from the study[7]. Selvaraj et al; worked on AISI 304 austenitic stainless steel to show influence of cutting parameters like speed, feed & depth of cut on surface roughness of material during dry turning. A plan of experiment based upon Taguchi's technique was used to acquire the data. An orthogonal array L9, S/N ratio and ANOVA was employed to investigate the cutting characteristics of material using coated TiC coated carbide tool. They found feed rate and cutting speed affects the surface roughness most and almost equally[8].

II. EXPERIMENTAL SETUP

In this study cylindrical work piece AISI-D3 tool steel was used, Chemical ingredients of the work-piece material as shown in Table 1. D3 tool steel is one of the widely used materials due to its high and unique strength That is maintained at elevated temperature and its exceptional wear resistance.

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Study of Properties of Sintered Forged Aluminium Powder Made by Unconventional Die

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ABSTRACT

Forging and sintering are two well explained processes used in the manufacturing of parts. This article investigates about the sintered forging process which is the combination of the above two processes. The die used in this process is modified die with several layers of different materials and heat treated accordingly instead of using tool steel to make an effective die with reduced cost. Quenching of selected parts is done to harden the die material. The samples of aluminium powder are made and examined for different parameters along with microstructure and it was observed that pores in the material will eliminate after sintering process. Also, the effect of load on the material is studied for density and hardness of different samples.

Keywords Sintered Forging, Characterization, Hybrid Die, Microstructure

INTRODUCTION

In recent years it has been observed that the world is moving on a fast way to achieve betterment of its working process which leads to growth in automation.Everyone is working on innovative ideas to hit the apex. To achieve the excellence in the work and to reach the peak one must not only focus on new techniques but also consider other parameters which helps in the growth of organization like reduction in waste, reduction in time and reduction in energy consumption. Reduction in energy consumption is more considerable than other factor as the generation of energy itself produces a lot of waste (millions of tons) every year which a major cause of death to thousands of people and extinction of various species from earth.

In current scenario the production units are growing at a very fast manner apart from that the automotive sector is taking lead. High performance vehicles which requires light and robust material with new manufacturing techniques. Aluminium is one of the basic element for such type of low weight parts and products.M.Tocci, et.al.in 2015Conclude that $AlSi_3Cr$ alloy wheels have better strength than conventional forged wheels[1] There are different types of manufacturing techniques used for production of aluminium parts based on the type and design of part to be manufactured. There are lot of manufacturing processes for aluminium like casting, sheet metal, powder metallurgy, forging, etc. In current work forging process isdiscussed although it is not the conventional forging process, it is the combination of powder metallurgy and sintering process[3-4]. The main aim of this work is to reduce the amount of energy required to perform these two operations simultaneously and also increase the material utilization percentage (Table 1) [2].

Table 1. Material comparison of conventional manufacturing process and sintered forging process

	Conventional manufacturing Process	Sintered Forging
Used Weight(gm)	560	325
Finished Part Weight(gm)	300	312
Material Loss(gm)	260	16
Material Utilization	54%	95%

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Behaviour of Fly Ash and Rice Husk Ash Based Geopolymer Concrete

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Keywords: Geopolymer concrete; sustainable; fly ash; rice husk ash; NaOH; Na_2SiO_3; molarity; heat curing.

Abstract. Geopolymer Concrete (GPC) is a novel concrete which has evolved in recent decades. It uses industrial waste products like fly ash (FA), ground granulated blast slag(GGBS), Rice husk ash (RHA), micro-silica, and red mud etc., from industries, with alkaline liquids to replace cement in concrete by 100%, thereby developing an eco-friendly and sustainable construction material and simultaneously reducing waste disposal problem of fly ash and rice husk ash. GPC not only possesses excellent mechanical properties it also have very good durability properties. This paper presents the effect of partial replacements of fly ash with rice husk ash on the properties of geopolymer concrete. Mixes chosen for investigation were GPC-1, GPC-2, GPC-3, GPC-4, and GPC-5 containing respectively 0%, 5%, 10%, 15%, and 20% RHA in place of FA. Various synthesis parameters like alkaline liquid to source material ratio, molarity of NaOH solution, sodium silicate to sodium hydroxide ratio were kept at their optimum values of 0.45, 12M, and 2.5 respectively. Heat curing was given to specimens by dry oven curing for initial 24 hours at a specified temperature of 70^0C, and then ambient exposure was given to the test specimens for periods of 3, 7, 28, and 90 days respectively. Results of tests conducted have been discussed in detail.

Introduction

Among all the construction materials the consumption of concrete is only next to water, and conventionally it is produced using Ordinary Portland cement (OPC) as main binder. Increasing infrastructure development has created a huge demand of concrete. Production of concrete requires substantial amounts of OPC. It is also known that in cement manufacturing, large amounts of CO_2 is released, which is one of the principal contributor to man-made Green House Gases (GHGs) emissions. In 2014, world's total cement production was estimated to be around 880 million tons and the CO_2 emissions due to cementitious material production was estimarted to be around 560 million tons [1]. This means for each ton of cement produced, approximately 0.635 ton of CO_2 is released into the atmosphere. In India itself, this figure was 1.12 ton in 1996, which has now decreased to a level of of 0.719 ton in 2010 due to the efforts by cement industry to reduce carbon emissions [2]. The GHGs like CO_2, No_x, CH_4 etc. cause global warming and consequential effects which is a serious enviornmental concern. Therefore, there is a further need of reducing carbon emissions by construction industry by limiting the use and hence the production of cement .

A significant achievement in this regard is the evolution of a novel construction material called *Geopolymer Concrete* which utilizes wastes materails like ground granulated blast furnace slag (GGBFS), FA, RHA, Red mud, micro-silica. from various industries with alkaline medium to fully replace cement in concrete. The term 'Geopolymer' was first coined by a French materials scientist Prof. Joseph Davidovits in 1978. Geopolymer concrete employs inorganically synthesized binder materials characterized by chains of inorganic molecules, derived from the synthesis of industrial by-products and alkaline medium [3], [4], [5], etc. By exploring the use of GPC, two environmental issues can be dealt simultaneously i.e. drop in carbon emissions into the atmosphere and secondly, utilization of the industrial wastes thereby tackling their dumping problem.

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New holographic dark energy in bianchi- *III* universe with k-essence

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ABSTRACT

The proposed dark energy, holographic, with new infrared cut-off (IR) of Granda and Oliveros (2009) has been investigated in Bianchi-III anisotropic model with the matter. The solutions of Einstein's field equations are found by assuming the time-dependent deceleration parameter. The deceleration parameter obtained in our model demonstrates the universe transition from early decelerating to the current accelerating stage. It has seen that our new holographic dark energy (NHDE) model corresponds to an accelerating universe with k-essence ($\omega_\phi < -1/3$). The statefinder diagnostic has also been performed in our model. In addition, correspondence between k-essence scalar field and our new holographic dark energy model has been reformulated. The k-essence dynamics of the potential and scalar field are reformulated, which depicts the accelerated expansion of the universe.

1. Introduction

Recently, observed astronomical phenomena have revolutionized the understanding of cosmology. About twenty years ago, the idea of universe which is in an accelerated expansion phase presently was discovered by various observations (Garnavich, 1998; Riess, 1998; Perlmutter, 1999; Spergel, 2003; 2007; Huang, 2006; Tegmark, 2004; Ade, 2016; Nasa, 2014). These observations demonstrate that our Universe is overwhelmed by bizarre cosmic fluid with huge pressure (negative), named, (DE) Dark Energy, which constitutes $\simeq 3/4$ (Padmanabhan, 2003; Sahni, 2004) of the critical density. It is trusted that the DE might be a dependable contender for the present cosmic acceleration. Yet, the nature of DE is secretive and its astounding inquiries, for example, where, how, why and when about the DE, are fascinating. The reason for the sudden change from the prior deceleration stage to the ongoing speeding up stage is as yet obscure.

Various candidates have been suggested for this strange DE, such as the cosmological constant (originally introduced by Einstein), k-essence (Chiba et al., 2000), quintessence (Sami and Padmanabhan, 2003), Chaplygin gas (Kamenshchik et al., 2001) and tachyon (Sen, 1999). A more thorough survey is given in Copeland et al. (2006), and suggested that cosmological constant is the simplest candidate for DE with the equation of state parameter (EoS) $\omega = -1$, except the fine-tuning problem to satisfy the present value of DE, since it fits the observational data well. Soon after the development of General Relativity by Einstein, many alternatives to GR had been proposed. Most of them, however, were lacking simplicity as well as observational fitting. Nevertheless, modification proposals have been published by researchers ever-since. Numerous models have been suggested to clarify this present accelerated expansion. A different approach was suggested in which Einstein field equation's geometrical part was modified to clarify the accelerated expansion of the universe which is known as modified gravity theory (Starobinsky, 1980; Kerner, 1982).

The cosmological constant problem has a twofold meaning: it is a problem of fundamental Physics because the value of the cosmological constant Λ is tied to vacuum energy density. On the other hand, the cosmological constant tells us something about the large-scale behavior of the universe, since a small cosmological constant implies that the observable universe is big and (nearly) flat (Hosoya and Mimic, 2000). The motivation to include Λ is that, in almost all the DE models, DE contains only a single component. However, since baryonic matter contains multiple components, while dark matter may also contain multiple components (Bertone et al., 2005). According to Hu (2015), it will be very interesting to take into account the possibility that DE contains multiple components. Recently, a new model of dark energy named Λ HDE, which contains two DE components: cosmological constant (Λ) and holographic dark energy (HDE) has been proposed (Hu, 2015). So far as we know, this is the first theoretical attempt to explore the possibility that DE may contain multiple components and simply discussed the cosmic evolutions of this model in a flat universe, and constrain this model with some observational data. Recently, the fractional growth parameter and statefinder hierarchy have been disagnosed in ΛHDE model by Zhou and Wang (2016). In this model, dark energy consists of two parts: cosmological constant Λ and HDE.

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Bianchi Type-I Dust-Filled Accelerating Brans–Dicke Cosmology

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Abstract—Spatially homogeneous and anisotropic Bianchi type-I cosmological models of Brans–Dicke (BD) theory of gravitation are investigated. The model represents an accelerating universe at present and is considered to be dominated by dark energy. The cosmological constant Λ is considered as a candidate for dark energy. The derived model agrees at par with the recent SN Ia observations. We have set the BD coupling constant ω to be 40000, according to the solar system tests and evidence. We discuss various physical and geometric properties of the models and compare them with the corresponding general-relativistic models.

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1. INTRODUCTION

Type Ia supernovae observations [1, 2], observations of the CMBR anisotropy spectrum [3], large-scale structure (LSS) [4] and Planck results for CMB anisotropies [5] ascertain that our universe is undergoing an accelerated expansion at present. It is considered to be dominated by dark energy that has negative pressure and is responsible for the present acceleration. As is well known, the universe had once gone through an accelerated phase during inflation for a very short period, so the present phase may be the second accelerated phase. The large-scale structure surveys and results of measurements of masses of galaxies [6] provide the best fit value of the density parameter for matter $\Omega_{m,0} = 0.3$ and consequently $\Omega_{\Lambda,0} = 0.7$. This research and the latest observations show that our universe is nearly flat.

The present scenario of acceleration of the universe and various observational cosmological facts regarding the present-day universe are very well explained by the Λ-cold dark matter (ΛCDM) cosmological model [7, 8]. In this model, Einstein's field equations are solved for a Friedmann–Robertson–Walker (FRW) metric in the presence of a positive cosmological constant as the source for dark energy, along with a perfect fluid matter distribution. It is a beauty of the ΛCDM model that the specific value of cosmological constant changes a decelerated phase of the universe into an accelerated one. The latest cosmological observations [9, 10] agree with the ΛCDM model.

Spatially homogeneous and anisotropic cosmology had been a matter of interest to cosmologists long back since 1962, when Heckmann and Schucking [11] wrote a chapter on an anisotropic Universe. The spatially homogeneous and anisotropic Bianchi type-I metric is often referred to as the Heckmann–Schuking metric. It was thought that neutrino viscosity in the primordial fireball [12, 13] may create an anisotropy in the Universe, which dissipates out as time passes. Accordingly, a large number of spatially homogeneous and anisotropic solutions of Einstein's theory have been obtained [14–24]. Later, the Wilkinson Microwave Anisotropy Probe (Bennett et al., [25]) also created interest in the investigation of anisotropic models of the universe. Recently, Goswami et al. [26–30] also developed ΛCDM type models for a Bianchi type-I anisotropic universe.

The fundamental and basic philosophy behind general relativity (GR) is that the gravitational field is identified with space-time geometry. Einstein was very much impressed by Mach's philosophy that the distant background of the universe has an impact on local matter and that the inertial property of matter is due to its interaction with distant matter. But the trouble in GR is that it does not fully incorporate Mach's principle [31]. A modified relativistic theory of gravitation, closely related to Jordan's theory [32] and compatible with Mach's principle was developed by Brans and Dicke in 1961 and is well known as Brans–Dicke (BD) gravity [33, 34]. The constant coupling

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Teleparallel dark energy in a system of $D0$-branes

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A new model which allows a non-minimal coupling between gravity and quintessence in the configuration of teleparallel gravity was recently proposed by Geng *et al.* ["Teleparallel" dark energy, *Phys. Lett. B* **704** (2011) 384–387] and they named it teleparallel dark energy. Now the main problem which arises is to know what is the source of this dark energy? The answer of this question is given by us in M-theory. This type of dark energy may be produced at three stages in our model. First, one six-dimensional universe is formed by combining and expanding $D0$-branes. We know that this universe-brane is polarized on two circles and our four-dimensional cosmos and two $D1$-branes are yielded. At third stage, two $D1$-branes glued to each other and one $D2$-brane is formed. This $D2$ connects our universe with another universe, gives its energy to them and causes the production of dark energy. Thus, the $D2$-brane is unstable and dissolves in our four-dimensional universes and supplies the needed teleparallel dark energy for expansion. These calculations are extended to M-theory and shown that the amount of teleparallel

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Transit dark energy string cosmological models with perfect fluid in $F(R,T)$-gravity

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In this paper, spatially homogeneous and anisotropic Bianchi type-VI_0 dark energy (DE) cosmological transit models with string fluid source in $f(R,T)$ gravity [T. Harko et al., *Phys. Rev. D* **84** (2011) 024020], where R is the Ricci scalar and T the trace of the stress energy–momentum tensor, have been studied in the context of early time decelerating and late-time accelerating expansion of the Universe as suggested by the recent observations. The exact solutions of the field equations are obtained first by using generalized hybrid expansion law (HEL) $\alpha = (e^{\alpha_0 t^{\alpha_1}})^{\frac{1}{\alpha_2}}$ which yields a time-dependent deceleration parameter $q = -1 + \frac{\alpha_1}{(\alpha_2 + \beta t^{\alpha_1})^{\alpha_2}}$ and second by considering the metric coefficient $A = \alpha^k$. By using recent constraints from supernovae type-Ia union data [Cunha, arXiv:0811.2379[astro-ph]], we obtain $\alpha = 0.8$ and $\beta = 0.1184$ for transit model $n = 2$. The Universe has an initial singularity and is anisotropic closed and it tends to be flat at the late time, i.e. our Universe is in accelerating expansion. Our model shows a phase transition property from decelerating to accelerating. It is remarkable to mention here that our Universe is homogeneous and anisotropic in the early phase whereas it becomes homogeneous and isotropic for $k = 1$. We have also discussed the stability of the background solution with respect to perturbations of the metric along with the properties of future singularities in the Universe dominated by DE including the phantom-type fluid. Various physical and dynamical parameters are also calculated and investigated in terms of time and redshift both.

Keywords: Cosmology; exact solution; $f(R,T)$-gravity theory, massive string; accelerating Universe.

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Magnetized string cosmological models of accelerated expansion of the Universe in $f(R,T)$ theory of gravity

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A class of spatially homogeneous and anisotropic Bianchi-V massive string models have been studied in the modified $f(R,T)$-theory of gravity proposed by Harko *et al.* [*Phys. Rev. D* 84:024020, 2011] in the presence of magnetic field. For a specific choice of $f(R,T) = f_1(R) + f_2(T)$, where $f_1(R) = \nu_1 R$ and $f_2(T) = \nu_2 T$; ν_1, ν_2 being arbitrary parameters, solutions of modified gravity field equations have been generated. To find the deterministic solution of the field equations, we have considered the time varying deceleration parameter which is consistent with observational data of standard cosmology (SNIa, BAO and CMB). As a result to study the transit behavior of Universe, we consider a law of variation for the specifically chosen scale factor, which yields a time-dependent deceleration parameter comprising a class of models that depicts a transition of the Universe from the early decelerated phase to the recent accelerating phase. In this context, for the model of the Universe, the field equations are solved and corresponding cosmological aspects have been discussed. The Energy conditions in this modified gravity theory are also studied. Stability analysis of the solutions through cosmological perturbation is performed and it is concluded that the expanding solution is stable against the perturbation with respect to anisotropic spatial direction. Some physical and geometric properties of the models are also discussed.

Keywords: Bianchi type-V Universe; $f(R,T)$-gravity theory; massive string; accelerating Universe.

PACS: 04.20.−q, 04.50.Kd, 98.80.Es

1. Introduction

Recent observational predictions from Supernova Cosmology Project collaboration [1], Super Search Team collaboration [2], WMAP collaboration [3], Planck Collaboration [4] that our Universe is going through a phase of accelerated expansion has put new avenues in modern cosmology. These observations indicate that our Universe is dominated by weird cosmic fluid with large and negative pressure, dubbed as dark energy (DE), which constitute ≃3/4 of the critical density ([5, 6]

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Technical Note

A low gradient junction technique of craniospinal irradiation using volumetric-modulated arc therapy and its advantages over the conventional therapy

Comparaison et avantages d'une arcthérapie volumétrique modulée craniospinale avec des gradients de faible dose au niveau des jonctions de faisceau par rapport à une radiothérapie conformationnelle tridimensionnelle classique

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ABSTRACT

A technique using volumetric-modulated arc therapy (VMAT) fields for craniospinal irradiation with low dose gradients at the field junction was tested for its sensitivity to positional inaccuracy. It was compared against the conventional three-dimensional (3D) conformal radiotherapy in terms of dose uniformity at the junction. Treatment plans generated for ten patients who received craniospinal irradiation (35 Gy in 21 fractions) by VMAT technique at our centre were included in this study. For these patients, 3D conformal radiotherapy plans were also generated in addition to the VMAT treatment plans. Intentional shifting of the cranial field in the superior and then in the inferior directions was done, creating a gap or overlap between the fields. Consequent changes in dose distributions in these two plans to positional inaccuracies were studied. The 3D conformal radiotherapy plans showed large dose variations at the junction due to positional shifts as compared to the VMAT plans. With a 5 mm superior shift of the cranial field isocentre creating a gap between the cranial and spinal fields, the magnitudes of under-dosing were 13.9 ± 3.6 Gy and 4.8 ± 2.0 Gy for 3D conformal radiotherapy and VMAT respectively. When the cranial field was moved by 5 mm inferiorly creating an overlap between the fields, overdose to the effects of 10.3 ± 4.0 Gy and 4.9 ± 1.3 Gy were observed for the 3D conformal radiotherapy plans and VMAT plans respectively. The VMAT technique is insensitive to longitudinal setup errors (1–3 mm) in patients because of the existence of low dose gradients at the junction between fields. This is unlike the 3D conformal radiotherapy plans which have steep dose gradients at the field edges and thus are highly sensitive to setup errors. Such an advantage for VMAT circumvents the need for dose feathering often practiced with the 3D conformal radiotherapy technique and makes the technique simpler to follow.

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ARTICLE

Quarkonium in a thermal BIon

Alireza Sepehri, Richard Pincak, Michal Hnatič, Farook Rahaman, and Anirudh Pradhan

Abstract: In the present article, the authors intend to propose a new theory that potentially allows the propagation of the formation and the evolution of quarkonium in a thermal BIon. When quarks are close to each other, quarkonium behaves like a scalar and, by their getting away, it transitions to a fermionic system. To analyze this particular behaviour, a new outlook approach needs to be adopted as the concurrent view is found deficient to analyse the aforesaid behaviour. Therefore, the authors, post-deliberation, accept that the fermions and fermionic systems are related. We need to accept a theory in which the origin of fermions and bosons is the same. However, in M-theory, these particles are independent and for this reason, we use a new broader theory based on Lie-*N* algebra and we call it broad Lie-*N* algebra (BLNA) theory. Thus, in a way, BLNA is M-theory with 11 dimensions. In this model, two types of energies with opposite signs emerge from nothing such that the sum over them becomes zero. They produce two types of branes with opposite quantum numbers and bosonic fields, which interact with each other and get compact. By compacting branes, the quarks and anti-quarks are produced on branes and exchange the graviton and the gravitino. These particles produce two types of wormholes, which act opposite to each other. They preclude the closing or diverging of the branes and also occurrence of confinement. This confined potential that emerges from these wormholes depends on the separation distance between quarks and anti-quarks and also on the temperature of the system and it is reduced to the predicted potential in experiments and QCD. Also, total entropy of this system grows with increasing temperature and produces a repulsive force, which leads to the separation of quarks and anti-quarks and also to the emergence of deconfinement.

Key words: quarkonium, BLNA-Theory, BIon, brane, M-theory.

Résumé : Nous voulons proposer ici une nouvelle théorie qui a le potentiel de prédire la propagation de la formation et l'évolution du quarkonium dans un système standard de deux solitons liés (BIon). Lorsque les deux quarks sont près l'un de l'autre, le quarkonium a le comportement d'un scalaire, mais lorsqu'ils s'éloignent, il se transforme en système fermionique. Une nouvelle approche est nécessaire pour analyser ce comportement particulier, puisque le point de vue concurrent est incapable d'expliquer ce comportement. Par conséquent, nous en sommes arrivés collectivement à la conclusion que fermions et systèmes fermioniques sont apparentés. Nous devons accepter une théorie qui dit que l'origine des bosons et des fermions est la même. Cependant, en théorie-M, ces particules sont indépendantes et à cause de cela, nous utilisons une nouvelle théorie plus étendue basée sur une algèbre de *N*-Lie et nous l'appelons l'algèbre de *N*-Lie étendue (ANLIE/BLNA). Ainsi ANLIE est une théorie M sur 11 dimensions. Dans ce modèle deux types d'énergie émergent de rien, de telle sorte que la somme sur les deux est zéro. Elles produisent deux sortes de branes, avec nombres quantiques opposés et des champs de bosons, qui interagissent et deviennent compactes. La compactification des branes produit les quarks et anti-quarks qui échangent graviton et gravitino. Ces particules produisent deux types de trou de ver qui agissent en opposition l'un envers l'autre. Ceci interdit la fermeture et l'évasion des branes l'un de l'autre, produisant un confinement. Ce potentiel de confinement qui émerge des trous de ver dépend de la distance de séparation entre le quark et l'anti-quark et sur la température du système et se réduit au potentiel prédit dans les expériences en CDD/QCD. De plus l'entropie totale du système augmente avec la température et produit une force répulsive qui mène à la séparation des quarks et anti-quarks et à l'émergence du déconfinement. [Traduit par la Rédaction]

Mots-clés : quarkonium, théorie de l'algèbre de *N*-Lie étendue, système de deux solitons liés, théorie M.

1. Introduction

One of the main puzzles in QCD is the reason for the confinement that occurs between quarks and anti-quarks that prevents quarks from going further away from or coming very close to each other; however, a transition from hadronic matter to a plasma of deconfined quarks and gluons for high temperature can be observed [1]. Many scientists have tried to resolve this problem. For example, in one investigation, researchers obtained the quark–anti-quark potential in d dimensions by using the explicit solution of $(d+1)$-dimensional dilatonic gravity. Their results were consistent with the predicted potential following IIB super-gravity and AdS–CFT [2]. In another research, it was argued that quark–anti-quark potential depends on the curvature in IIB super-gravity background with non-trivial dilaton and with curved four-dimensional space. This potential showed confinement for the

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Research in Astronomy and Astrophysics

Lyra's cosmology of hybrid universe in Bianchi-V space-time

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Abstract In this paper we have searched for the existence of Lyra's cosmology in a hybrid universe with minimal interaction between dark energy and normal matter using Bianchi-V space-time. To derive the exact solution, the average scale factor is taken as $a = (t^n e^{kt})^{\frac{1}{m}}$ which describes the hybrid nature of the scale factor and generates a model of the transitioning universe from the early deceleration phase to the present acceleration phase. The quintessence model makes the matter content of the derived universe remarkably able to satisfy the null, dominant and strong energy condition. It has been found that the time varying displacement $\beta(t)$ co-relates with the nature of cosmological constant $\Lambda(t)$. We also discuss some physical and geometrical features of the universe.

Key words: cosmology: hybrid universe — cosmology: dark energy — cosmology: Bianchi-V space-time

1 INTRODUCTION

In the recent past, astronomical observations of SNe Ia (Riess et al. 1998; Perlmutter et al. 1999; Riess et al. 2001; Rodrigues 2008) have indicated that the present universe is undergoing an accelerated expansion. However, the cause of this acceleration is still unknown and represents an open question for theoretical physicists. In the literature, numerous cosmological models had been proposed to resolve this problem including the modified theory of gravity and possible existence of dark energy (DE).

Firstly, Caldwell et al. (2006) and later on several other authors (Yadav 2012; Yadav & Sharma 2013; Pradhan & Amirhashchi 2011; Yadav 2016) studied models of the transitioning universe in different physical contexts. The cosmological constant Λ is assumed to be the simplest candidate for DE but it suffers from two problems on theoretical grounds – fine tuning and cosmic coincidence. So, in the literature, different models of DE with various effective equations of state (EoSs) have been proposed.

A Bianchi type-V universe, being the natural generalization of the Friedmann-Robertson-Walker model of the universe, is of particular interest because it describes a homogeneous and anisotropic universe that has different scale factors along each spatial direction. Moreover, the Bianchi-V universe converts to the Bianchi-I universe by considering specific choices for parameters. In 2011, Kumar and Yadav investigated the Bianchi-V DE model governed by power law expansion. Later on, Pradhan & Amirhashchi (2011) proposed the simple form of a hybrid expansion law in Bianchi-V space-time. In Kumar & Yadav (2011); Pradhan & Amirhashchi (2011), the authors considered an isotropic distribution of DE, but here we assume the generalized form of a hybrid expansion law in Bianchi-V space-time with an anisotropic distribution of DE that gives new and different expressions for cosmological parameters. In the literature, several authors (Yadav & Yadav 2011; Akarsu & Kılınç 2010; Kumar & Yadav 2011; Kumar & Singh 2011; Pradhan et al. 2012) have considered the EoS of DE ($\omega^{(de)}$) to be time dependent. A time dependent $\omega^{(de)}$ describes the three types of accelerating universe models - quintessence, ΛCDM and phantom. According to the latest cosmological data available, the associated uncertainties are still too large to discriminate these three

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Some Bianchi type-V accelerating cosmological models in $f(R,T) = f_1(R) + f_2(T)$ formalism

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In this paper, we have studied the transition and physical behavior of Bianchi type-V cosmological models within the formalism of $f(R,T)$ gravity. To obtain the solution of field equations and phase transition of universe consistent with recent cosmological observations, time varying deceleration parameters are considered. In this paper, we used two different scale factors of the form (I) $a = (t^m e^{\beta t})^{1/n}$, where $n \geq 0, m \geq 0, \beta \geq 0$ are constants. Here, for $n \geq 2$, the universe shows transition with accelerated expansion. (II) $a = (\sinh \beta t)^{1/n}$, where $n \geq 0$ and $\beta \geq 0$ are constants. For $n \geq 2.5$, the universe achieves a phase transition from early decelerating to current accelerating phase. The model I initially starts with quintessence scenario ($\omega > -1$) and ends up with ($\omega = -1$) as a model with cosmological constant (Λ) as $t \to \infty$. Model II, for $n = 2.5$ indicates the phantom energy scenario and for $n \geq 3$, the model starts with quintessence $\omega > -1$ and ends with vacuum energy scenario. A point type singularity has been observed in the derived model I. Some physical and geometrical properties of the models have been established and discussed to derive the validity of models with respect to recent astrophysical observations.

Keywords: Bianchi type-V space-time; $f(R,T)$ gravity; variable deceleration parameter.

Mathematics Subject Classification 2020: 83F05, 83C15

1. Introduction

This study of universe shows that it is now under the phase of expansion and the numerical estimates confirm its accelerated expansion. A high redshift supernova

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Article

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Effect of Temperature on Volume, Thermal Expansivity and Bulk Modulus in Nanomaterials

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In the present work, the author has used the potential independent theoretical models for the determination of variation of thermo elastic parameters such as coefficient of volume expansion, volume expansion and bulk modulus for nanocrystals of silver (Ag) and aluminium (Al). The temperature dependent forms of Tait's equation of state and Murnaghan equation of state are employed. The values obtained from the equation of states (EOS's) for volume expansion are compared with the available experimental results. The results obtained are used to choose the best model from the two models considered to study the thermoelastic properties of nanomaterials. A good agreement has been obtained between the theoretically calculated results and available experimental data.

Keywords: Equation of State, Nanocrystals, Thermal Expansion, Thermal Expansion Coefficient.

1. INTRODUCTION

The thermo elastic properties of metallic solids, minerals and alloys etc. have been studied by many scientists under pressure and temperature. This study helps to understand the earth's interior as it provides important information about the evolution of the earth. The change in temperature and pressure affects the atomic stability of the solid material and as a result alter the physical properties of the material like compression, heat conduction, elastic properties, thermal expansion etc.[1,2] It is found that very less quantity of nanocrystalline forms of minerals are present inside the earth's crust; however their importance cannot be neglected.[3–5] In past few years, there has been intensive study, both experimental and theoretical, to explore the fascinating physical properties of nanomaterials. The study of nanomaterials having dimension upto 100 nm is current area of interest to understand its intrinsic characteristics. Large surface to volume ratio in nanomaterials enhance the surface effects and make them different from their bulk form. Because of the significant difference in behavior of nanomaterials from the bulk form, their study under high pressure and temperature is necessary. Various experimental and theoretical studies are performed on nanomaterials under high pressure and temperature.[6–12] However, the theoretical studies are less. So, a theoretical method is presented here for the study of nanocrystals under high temperature.

2. METHOD OF ANALYSIS

The Tait's equation of state is expressed as follows:[13–15]

$$V(P,T_o)/V(o,T_o) = 1-\frac{1}{(B'_o+1)}\ln\left\{1+\left(\frac{B'_o+1}{B_o}\right)(P)\right\} \quad (1)$$

where B_o, V_0 are bulk modulus and initial volume at zero pressure. B'_o is the pressure derivative of bulk modulus. For including the temperature effect in Eq. (1), the thermal pressure (P_{Th}) term is introduced in Eq. (1) given by:

$$P_{\mathrm{Th}} = \alpha_0 B_0 (T-T_0) \quad (2)$$

So, the net pressure acting on the solid is given as:

$$P_T = P - \alpha_0 B_0 (T-T_0) \quad (3)$$

The temperature and pressure dependent Tait's equation of state is expressed as:

$$V(P,T_o)/V(o,T_o) = 1-\frac{1}{(B'_o+1)}\ln\left\{1+\left(\frac{B'_o+1}{B_o}\right)\times(P-\alpha_0 B_0(T-T_0))\right\} \quad (4)$$

Putting $P=0$, the temperature dependent form of equation is expressed as:

$$V(P,T_o)/V(o,T_o) = 1-\frac{1}{(B'_o+1)}\ln\{1-\alpha_0(B'_o+1)(T-T_0)\} \quad (5)$$

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Size and shape effects on the band gap of semiconductor compound nanomaterials

Madan Singh, Monika Goyal & Kamal Devlal

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Study of temperature dependent volume expansion in nanomaterials.

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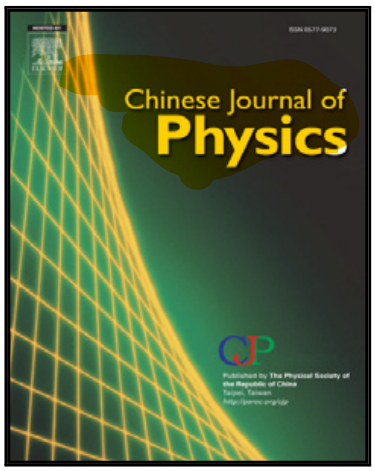
Author(s): GOYAL, M.; GUPTA, B. R. K.

Abstract:
A temperature dependent model is formulated to study the thermo-elastic properties of nanomaterials. The model is based on quasi-harmonic approximation and Anderson Gruneisen parameter is considered to vary with temperature linearly. Present model is the modified form of the equation of state (EoS) recently developed by Goyal and Gupta to explain the thermal behavior of solids. The values of volume expansion and bulk modulus calculated from the present model under varying temperature conditions are compared with the available experimental data and also with those obtained from Birch-Murnaghan equation (BME) and Fang equation for fullerene (C60), 20-nm nickel, and 15 nm (Ni+Fe) nanocrystal. The present model is further extended to study the variation in thermal expansion coefficient with temperature. It is found that the results obtained from the present model are in good agreement with the experimental data which verifies the suitability and applicability of the present model. It is also reported that the trend of variation of thermal expansion in nanomaterials is almost same as it is found in bulk materials under varying conditions of temperature.



Shape and Size dependent thermophysical properties of nanocrystals

M. Goyal , B.R.K. Gupta

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Shape, size and phonon scattering effect on the thermal conductivity of nanostructures

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Abstract. A phenomological model is described here to study the effect of size, shape and phonon scattering on the thermal conductivity of nanostructures. Using the classical model proposed by Guisbiers *et al* (*Phys. Chem. Chem. Phys.* **12**, 7203 (2010), *J. Phys. Chem. C* **112**, 4097 (2008)) in terms of the melting temperature of nanostructures, the expression for variation of thermal conductivity is obtained in terms of shape and size parameter. An additional term is included in the expression of thermal conductivity to consider the impact of phonon scattering due to the surface roughness with a decrease in size. The expression of thermal conductivity is obtained for spherical nanosolids, nanowires and nanofilms. The thermal conductivity is found to decrease in nanostructures in comparison with the counterpart bulk material. The values of thermal conductivity obtained from the present model are found to be close to the available experimental data for different values of roughness parameter which verifies the suitability of the model.

Keywords. Nanomaterials; shape factor; size effect; roughness parameter; thermal conductivity.

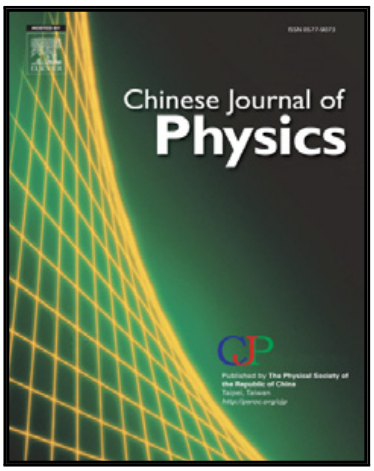
PACS Nos 65.80.+n; 72.20.−i

1. Introduction

The study carried out to understand the heat conduction and thermal transport mechanism in semiconductors has been of great scientific interest because of its worldwide applications in thermoelectric and optoelectronic devices [1–3]. The phenomenon of heat transport is dominated by phonons in bulk semiconductors and results in excellent thermal properties. The thermal transport properties of nanomaterials are also important to study the development of nanoscale electronic devices. Various methods have been applied by scientists to understand the physical, optical, electronic properties of nanomaterials and the practical applications of nanodevices [4–7]. Experimental as well as theoretical investigations are performed to study the thermal properties of pure semiconductors, semiconductor alloys and their superlattices. The efficiency of thermoelectric modules depends on the thermoelectric figure of merit (ZT) of its components. ZT depends on the Seeback coefficient, electrical resistivity and thermal conductivity. For nanostructured materials, the reduction in thermal conductivity contributes to the improvement in the figure of merit [8–11]. The thermal conductivity in nanoscale semiconducting systems is found to vary with reduction in size and is found to be smaller in nanomaterials than in the bulk form of the same material. These studies explain that the thermal transport properties in nanomaterials are different from that of their bulk form due to a decrease in size and quantum confinement, an increase in surface area-to-volume ratio in nanomaterials and reduction in phonon transport due to the scattering contribution [12–14]. Theoretical models that include the shape, size and scattering effect are still lacking, and so there is a need for a better theoretical model to explain the experimental results well at room temperature. In the present work, we have applied a phenomenological model based on classical thermodynamics to analyse the variation in thermal conductivity of nanostructures in comparison with the bulk with respect to size [15–17]. The mathematical formulation is presented in §2 and the results obtained from the present approach are discussed in §3.

2. Mathematical formulations

Using the energy conservation law and concept of classical thermodynamics for a nanostructure, the



Applicability of Equation of state in extreme compression region and study of diatomic solids under pressure

P. Chaturvedi , M. Goyal

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Shape, size and temperature dependency of thermal expansion, lattice parameter and bulk modulus in nanomaterials

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Abstract. A theoretical model is described here for studying the effect of temperature on nanomaterials. The thermodynamic equation of state (EoS) proposed by Goyal and Gupta in *High Temp.-High Press.* **45**, 163 (2016); *Oriental J. Chem.* **32**(**4**), 2193 (2016), is extended in the present study using Qi and Wang model [*Mater. Chem. Phys.* **88**, 280 (2004)]. The thermal expansion coefficient is expressed in terms of shape and size and used to obtain the isobaric EoS of nanomaterials for the change in volume V/V_0. The variation in V/V_0 with temperature is estimated for spherical nanoparticles, nanowires and nanofilms. It is found that the volume thermal expansivity decreases as size of the nanomaterial increases, whereas V/V_0 increases with temperature across nanomaterials of different sizes. The lattice parameter variation with temperature is studied in Zn nanowires, Se and Ag nanoparticles. It is found that lattice constant increases with increase in temperature. Also, bulk modulus is found to increase with temperature in nanomaterials. The results obtained from the present model are compared with the available experimental data. A good consistency between the compared results confirms the suitability of the present model for studying thermal properties of the nanomaterials.

Keywords. Nanomaterials; shape factor; size effect; thermal expansion; equation of state.

PACS Nos **64.10.+h; 64.30.+t; 65.80.+n**

1. Introduction

The study based on thermophysical, optical, electronic and thermal properties of nanomaterials is of great scientific interest because of their technological applications all over the world [1–4]. However, it is difficult to study such properties as they vary with shape and size of the material. It is noted that the surface area to volume ratios in nanomaterials increase as the size reduces and therefore the thermophysical properties of nanomaterials are different from that of their bulk material. Because of the surface effects, nanomaterials possess more rich metastable structures than their bulk form [5–8]. Also, the number of surface atoms vary with shape of the nanostructure which in turn affects the physical properties of the nanomaterial. Elastic properties like thermal expansivity, lattice parameter, Young's modulus, bulk modulus and volume compression get affected due to change in shape and size of the nanomaterial. The grain size is found to increase with increase in temperature in nanomaterials. Therefore, it is essential to consider both shape and size parameters for understanding the properties of nanomaterials. Various simulations and experimental methods have been described to explore the physical properties of nanomaterials of different sizes [9–12]. Top-down approaches are mostly based on classical thermodynamics and bottom-up approaches are based on complicated simulations for the analysis of thermophysical properties of nanomaterials. Both bottom-up [13,14] and top-down approaches [15,16] are used to study elastic properties of nanomaterials of different shapes at different temperatures. Different theoretical models and equations (EoS) are proposed earlier [17–19] to explore the properties of nanomaterials under pressure and temperature. In the present work, we have proposed a simple and generalised form of EoS to analyse the effect of size, shape and temperature on thermomechanical properties of nanostructures. In the present study, an equation of state is proposed to analyse the effect of shape and size on the volume of nanomaterials at different temperatures. The model theory of formulation is presented in §2 and the validity of the

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Beat wave cyclotron heating of rippled density plasma

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Research Article

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Beat wave heating; Bernstein quasi-mode; magnetized plasma; ponderomotive force

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Abstract

Laser beat wave heating of magnetized plasma *via* electron cyclotron damping is proposed and analyzed. A plasma density ripple is presumed to exist across the magnetic field. Two collinear lasers propagating along the magnetic field exert a beat frequency ponderomotive force on electrons, driving a large amplitude Bernstein quasi-mode which suffers cyclotron damping on electrons. Finite Larmor radius effects play an important role in the heating. Electron temperature initially rises linearly with time. As the temperature rises cyclotron damping becomes stronger and temperature rises rapidly. The process, however, requires ripple wavelength shorter than the wavelength of the beat wave.

Introduction

The excitation of collective modes in plasmas by beating intense electromagnetic beams has been studied extensively over the years (Tajima and Dawson, 1979; Joshi *et al.*, 1984; Clayton *et al.*, 1993; Krall *et al.*, 1993). The plasma waves excited by such schemes have proven useful for electron acceleration up to ultra-relativistic energies (Liu and Tripathi, 1994; Nakajima *et al.*, 1995; Esarey *et al.*, 1996; Ting *et al.*, 1997; Jarwal *et al.*, 1999). In tokomak, radio frequency wave driven space charge modes are used for current drive, plasma heating, and diagnostics (Liu and Tripathi, 1986).

The efficiency of mode coupling processes is significantly influenced by the presence of plasma density ripple. Experimental and analytical studies have demonstrated resonant enhancement in the efficiency of second and third harmonic generation and terahertz generation due to density ripples (Parashar and Pandey, 1992; Liu and Tripathi, 2008; Kumar and Tripathi, 2012. Vijay and Tripathi (2016) found density ripple to be effective in laser beat frequency heating of unmagnetized plasma. Malik *et al.* (2017) have reported resonant enhancement in two color laser excitation of terahertz radiation due to a density ripple.

In this paper, we study the beat frequency heating of a magnetized plasma in the presence of a density ripple. The magnetic field introduces cyclotron damping as an effective route to energy deposition where finite Larmor radius effects could also play a role. We employ two collinear lasers, with frequency difference near the electron cyclotron frequency, propagating along the static magnetic field but transverse to ripple wave vector. The beat frequency ponderomotive force by the laser drives an electrostatic Bernstein quasi-mode (Kumar and Tripathi, 2010). The mode is cyclotron damped on electrons and gives rise to strong electron heating. We employ fluid theory to obtain electron response to lasers and Vlasov theory to obtain the response of magnetized electrons at the beat frequency, including finite Larmor radius effects.

In Section "Excitation of Bernstein quasi-mode", we deduce the beat frequency electric field produced by two collinear lasers in a rippled density plasma. In Section "Anomalous heating", we obtain the anomalous heating rate of electrons and study the rise in electron temperature. In Section "Discussion", we discuss the results.

Excitation of Bernstein quasi-mode

Consider a magnetized plasma of electron density n_0, electron temperature T_e, and ambient magnetic field $B_s\,\hat{z}$. The plasma has a density ripple,

$$n_0 = n_0^0 + n_q$$

$$n_q = n_{q_0} e^{iqx} \tag{1}$$

Two collinear lasers propagate through the plasma along the magnetic field (Fig. 1),

$$\vec{E}_j = \hat{x} A_j e^{-i(\omega_j t - k_j z)},\ j = 1, 2 \tag{2}$$

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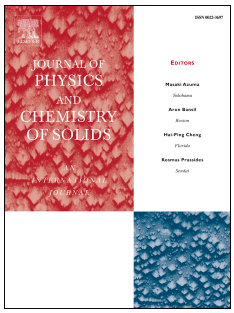

Equation of state, thermoelastic properties and melting behavior of NaCl at high temperatures and high pressures

K. Sheelendra, A. Vijay

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Terahertz generation via laser coupling to anharmonic carbon nanotube array

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A scheme of terahertz radiation generation employing a matrix of anharmonic carbon nanotubes (CNTs) embedded in silica is proposed. The matrix is irradiated by two collinear laser beams that induce large excursions on CNT electrons and exert a nonlinear force at the beat frequency $\omega = \omega_1 - \omega_2$. The force derives a nonlinear current producing THz radiation. The THz field is resonantly enhanced at the plasmon resource, $\omega = \omega_p(1+\beta)/\sqrt{2}$, where ω_p is the plasma frequency and β is a characteristic parameter. Collisions are a limiting factor, suppressing the plasmon resonance. For typical values of plasma parameters, we obtain power conversion efficiency of the order of 10^{-6}. *Published by AIP Publishing.* https://doi.org/10.1063/1.5010396

I. INTRODUCTION

High power laser carbon nanotube (CNT) interaction has emerged as an active field of research with applications in spectroscopy, harmonic generation, THz generation, material characterization, photovoltaic manufacturing, etc.[1–6] A novel feature of interaction is plasmon resonance at $\omega = \omega_p/\sqrt{2}$, where ω_p is the plasma frequency of nanotube free electrons. Initially, the plasma frequency may be high; however, as the electrons get heated by the laser, CNTs expand, electron density decreases, and resonance may be met. Kumar and Tripathi[7] have observed a sharp enhancement in Rayleigh scattering on an intense short pulse laser due to this resonance.

The interaction of high power laser pulses with metallic targets is accompanied by the generation of energetic electrons. Zhuo *et al.*[8] have found that intense THz radiation having electric field >58 G v/m and laser to THz radiation conversion efficiency up to 0.75% can be achieved. Bhasin and Tripathi[9] have observed resonant THz radiation generation by the optical rectification of picoseconds in a rippled density magnetized plasma.

Ravi *et al.*[10] have developed an analytical model for multi cycle THz generation using second order nonlinear optical techniques. Several experiments and particle in cell (PIC) simulation have explained anharmonicity in response to electron cloud of clusters to intense laser field, given the increased broadened surface plasmon and laser absorption. Kundu *et al.*[11–13] have carried studies of broadband nonlinear absorption and PIC simulation for harmonic generation from laser irradiated clusters. The interaction of short laser pulses with gases embedded with clusters holds the promise of efficiency enhancement of surface plasmon resonance.[14,15] Donnelly *et al.*[16] reported high order harmonic generation and reduction in saturation of the harmonic signals at a high laser intensity in atomic clusters.

Kumar and Tripathi[17] have developed an analytical formalism for nonlinear absorption and harmonic generation of the laser in a gas with anharmonic clusters due to this resonance. Kumar and Tripathi[18,19] have studied the laser heating and expansion and obtained the radiated THz power due to the ponderomotive force. The restoration force on cluster electrons was taken to be a nonlinear function of displacement, and collisions were included in electron-ion collision.

Jain *et al.*[20] have studied the effect of static magnetic field on THz generation due to the laser interaction with an array of CNTs, lying on a metallic surface. The ponderomotive force on the free electrons of the CNTs acts at twice the modulation frequency, which lies in the THz range. Kadlec *et al.*[21] experimentally showed THz radiation generation at gold surfaces. They found a peak value of THz field as ~4 kV/cm for a thickness of ~150 nm and an incidence angle at ~45°. Bhasin and Tripathi[22] have calculated the surface plasma wave amplitude $(r_0\lambda_L)^{1/2}$, at given laser power, where r_0 is the size of the laser spot and λ_L is wave length of the laser and could be an order of magnitude larger than the laser amplitude. The THz surface plasma wave has very weak linear damping; hence, the efficiency of THz power generation η_{THz} is large.

In this paper, we develop a formulism for nonlinear absorption and THz generation of the laser embedded with hollow CNT electrons, which is taken to be a nonlinear function of displacement and collisions. The execution of restoration force on electrons decreases and the CNT response to the laser shows large resonance absorption. In Sec. II, we study nonlinear resonance absorption by using a matrix of hollow CNTs on the surface of silica. In Sec. III, we study terahertz generations. When the laser is applied on CNTs, electrons and ions are displaced by Δ and a new frequency factor ω is created. A discussion of results is given in Sec. IV.

II. NONLINEAR RESONANCE ABSORPTION

Consider a matrix of carbon nanotubes interspersed in silica (cf. Fig. 1). There are n_c CNTs per unit volume, and each nanotube is characterized by inner and outer radii a and

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Classical Relativistic Extension of Kanai's Frictional Lagrangian

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Working in an arbitrary Lorentz frame, we address the question of formulating the covariant variational principle for classical, single-particle, dissipative, relativistic mechanics. First, within a Minkowskian geometry, the basic properties of the proper time τ and the covariant velocity u_μ are recapitulated. Next, using a scalar function $\psi(x)$ and its negative derivatives φ_μ's, we construct a covariant Lagrangian Λ that generalizes the famous Bateman-Caldirola-Kanai Lagrangian of non-relativistic frictional mechanics. Finally, we propose a deterministic model for ψ (involving the drag coefficient A) whose explicit solution leads to relativistic damped Rayleigh motion in the rest frame of the medium.

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I. INTRODUCTION

In the context of nonrelativistic, classical, single-particle mechanics, the variational formulation [1, 2] is well established both for conservative and dissipative motions. Subject to symmetry requirements, a Lagrangian L can be constructed as a function of the ordinary position x and the velocity v at clock time t. The non-relativistic L has no explicit t-dependence if energy is conserved (as shown by Hamilton), but an explicit t-dependence is needed both in the classical and the quantum contexts if energy is dissipated in an irreversible manner, as demonstrated by Kanai [3] and other workers [4–6].

The status of relativistic, conservative dynamics is also satisfactory. Standard books [7,8] define concepts such as the covariant position x_μ and velocity u_μ at proper time τ. Also, the covariant description of a harmonic oscillator [9] is known, and the invariant action for a particle interacting with an electromagnetic field [10] has been established. Of course, particle motion in general relativity [11] is not of interest here. In Ref. 9, an alternative Lagrangian formalism is applied to the relativistic extension of the simple harmonic oscillator. The immediate consequence of the alternative Lagrangian formalism is the proper time equations of relativistic motion. The proper time (τ) for a material particle is related to the coordinate time t by $\mathrm{d}t = \gamma \mathrm{d}\tau$, where $\gamma = \left(1 - v^2/c^2\right)^{-1/2}$, v being the velocity of the particle. We emphasize that the concepts of effective energies are applicable not only to the special case of the relativistic harmonic oscillator but also to the relativistic extension of classical mechanics. According to Ref. 10, the homogeneous Lagrangian is a completely adequate basis for covariant Lagrangian theory both in classical and quantum mechanics. Johns [10] developed the Hamilton - Jacobi theory in a straightforward manner by using the unmodified homogeneous Lagrangian form, even though the Hamiltonian vanishes identically. In addition, the Klein - Gordon equation is still derived using the unmodified homogeneous Lagrangian, which provides the covariant Lagrangian basis usually followed in quantum-mechanics texts. Gonzalez [12] developed a general formalism to obtain the Lagrangian and the Hamiltonian for a one-dimensional dissipative system and applied it to the case of a relativistic particle under the action of a dissipative force proportional to its velocity. The relativistic wave function is derived for a free particle with linear dissipation by using that obtained Hamiltonian.

Unfortunately, the status of relativistic, frictional mechanics is unsatisfactory in the existing literature and the aim of the present paper is to address this issue. More precisely, the work of Gonzalez [12] does not define partial derivatives such as $\partial\tau/\partial x_\mu$ and preuses the desired equation of motion itself while attempting to construct only the usual Lagrangian L. We overcome these lacunae below in Sec. II by judiciously defining $\partial\tau/\partial x_\mu$ and do not preuse the desired equation of motion while constructing a manifestly invariant Lagrangian Λ in a rather general manner. Next, in Sec. III we show that such a Λ, indeed, gives the desired extension of Kanai's philos-

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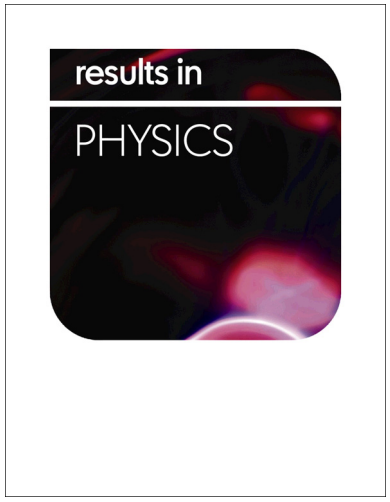

Non-minimal matter-geometry coupling in Bianchi I space-time

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ABSTRACT

Carbon quantum dots (CQDs) are a new class of fluorescence small carbon nanoparticles with a particle size of less than 10 nm and have vast applications in the field of bioimaging, biosensing and disease-detection. These are promising materials for nano-biotechnology since it has smaller particle size, excellent biocompatibility and excitation wavelength dependent photoluminescence (PL) behavior, photo induced electron transfer, chemical inertness and low toxicity. These materials have excellent fluorescent properties such as broad excitation spectra, narrow and tunable emission spectra, and high photostability against photo bleaching and blinking than other fluorescent semiconductor quantum dots. This review article demonstrate the recent progress in the synthesis, functionalization and technical applications of carbon quantum dots using electrochemical oxidation, combustion/thermal, chemical change, microwave heating, arc-discharge, and laser ablation methods from various natural resources. Natural carbon sources are used for the preparation of CQDs due to its low cost, environmental friendly and widely available.

1. Introduction

Carbon quantum dots (CQDs) are first discovered in 2004 during the purification of single walled carbon nanotubes. CQDs possess very strong and tunable fluorescence properties which enable their applications in biomedicines, optronics, sensors and catalytic applications. It has excellent photostability, small size, highly tunable photoluminescence (PL) property, biocompatibility, electro-chemiluminescence, exceptional multi-photon excitation (up-conversion) property. These materials can be functionalized with biomolecules and are less toxic and chemically inert for which these are used as effective carriers for drug delivery, biological imaging. CQDs also have promising applications in sensors, optronics and electrochemical luminescence [1–3].

Conventionally, CQDs are prepared by the surface functionalization of carbon nanoparticles with organic and polymeric molecules [4,5]. Most of the preparation methods have followed the carbonization of carbon containing precursors. CQD synthesized by this method has widely varying optical properties but less controllable. The carbonization of various fruit juices, watermelon or pomelo peels, many food items, grass and plant leaves have produced CQDs [6–8]. Chitosan is also used as a precursor for synthesis of CQD by hydrothermal carbonization [9]. Various techniques of synthesis of carbon quantum dots, such as ultrasonic methods, hydrothermal treatment, laser ablation of graphite and microwave-assisted synthesis [10–12], strong acidic and electrochemical oxidation [13], pyrolysis of glycerol [14], exfoliation of graphite in organic solvent by modified Hummer's method [15], thermal annealing of barbecue meat (BBQ) char [16], thermal carbonization of molecules [12] as well as atmospheric plasma-based synthesis [17,18] have been reported. The precursors are widely varied as sweet pepper [19], capsicum [20], watermelon peel [21] and synthetic polymer [22] have been reported. In this article, we have described various synthesis methods of CQDs using different precursors involving various techniques of synthesis. The advantages of using natural resources for the synthesis of CQDs are cost-effective and eco-friendly. The green synthesis methods are highly acceptable as compared to physical and chemical processes. The numerous waste organic products are also used for the preparation of CQDs. The researchers are inspired to develop new scheme using readily available carbon source in nature. Generally, carbon quantum dots are synthesized by both top-down and bottom-up methods using chemical, electrochemical or physical techniques. Graphite, active-carbon, carbon nanotubes and

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Pt decorated MoS_2 nanoflakes for ultrasensitive resistive humidity sensor

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Abstract

In this work, we report the fabrication of a low power, humidity sensor where platinum nanoparticles (NPs) decorated few-layered molybdenum disulphide (MoS_2) nanoflakes have been used as the sensing layer. A mixed solvent was used to exfoliate the nanoflakes from the bulk powder. Then the Pt/MoS_2 composites were prepared by reducing Pt NPs from chloroplatinic acid hexahydrate using a novel reduction technique using sulphide salt. The successful reduction and composite preparation were confirmed using various material characterization tools like scanning electron microscopy, atomic force microscopy, transmission electron microscopy, x-ray diffraction, x-ray photoelectron spectroscopy, Raman spectroscopy and UV–visible spectroscopy. The humidity sensors were prepared by drop-coating the Pt-decorated MoS_2 on gold interdigitated electrodes and then exposed to various levels of relative humidity (RH). Composites with different weight ratios of Pt were tested and the best response was shown by the Pt/MoS_2 (0.25:1) sample with a record high response of ~4000 times at 85% RH. The response and recovery times were ~92 s and ~154 s respectively with repeatable behaviour. The sensor performance was found to be stable when tested over a few months. The underlying sensing mechanisms along with detailed characterization of the various composites have been discussed.

Supplementary material for this article is available online

Keywords: MoS_2 nanoflakes, mechanical exfoliation, Pt decoration, resistive sensor, humidity sensing

(Some figures may appear in colour only in the online journal)

1. Introduction

The recent climate change and the living quality requirement of the modern era have necessitated the monitoring of humidity in various fields like semiconductor fabrication laboratories, automobile industry, food industry, medicine industry, agriculture etc [1]. This has urged academicians and industries to develop handheld, highly sensitive, low cost, ultrafast humidity sensors that will be useful for process sensitive application areas like micro-fabrication, green-house plantations etc. A recent survey has made an estimation that the humidity sensor market by 2020 will reach ~$ 2.3 billion [2]. Amongst the various well-known transduction techniques used for humidity sensors, namely resistive [3], capacitive [4, 5], optical fibre based [6], field effect transistor [7], surface acoustic wave [8], quartz crystal microbalance [9] etc, most of the commercially available humidity sensors rely on capacitive technique where a change in dielectric constant of sensing layer (usually a polymer) occurs in presence of humidity. However, owing to certain limitations like hysteresis, stability issues at high temperature and high humidity levels, recent focus has shifted towards resistive humidity sensors which

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An efficient electrode for simultaneous determination of guanine and adenine using nano-sized lead telluride with graphene†

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Herein, lead telluride (PbTe) nanocrystals were chemically synthesized at room temperature *via* reduction of homogeneous mixtures of tartrate complexes of Pb^{2+} and Te^{4+} with sodium borohydride. Graphene (GR) was synthesized through thermal reduction of graphene oxide (GO) in the presence of Zn dust. The structure, phase, and morphology of the synthesized PbTe and GR were characterized by XRD, FESEM, and EDX. Cyclic voltammetry (CV) and differential pulse voltammetry (DPV) were used to study the electro-oxidation behaviors of guanine and adenine molecules on the surface of the composite of lead telluride and graphene-modified graphite paste electrode (PbTe/GRGP). The voltammetric responses revealed that the electrocatalytic properties of these biomolecules (GU and AD) were significantly improved after incorporation of both PbTe nanoparticles and graphene into graphite powder in comparison with those of bare graphite (bare GP) and the graphene graphite paste electrode (GR/GP). CV studies indicate well defined and distinct irreversible oxidation peaks for both biomolecules upon treatment of the PbTe/GRGP electrode with a solution of biomolecules in phosphate buffer (pH 5). DPV measurements illustrated the appearance of two well defined oxidation peaks of GU and AD with a peak potential separation of 289 mV. Under optimized experimental conditions, the modified electrode exhibited wider linear ranges of 4–140 μM and 3–50 μM with the detection limits of 80 nM (S/N = 3) and 70 nM for GU and AD, respectively. Furthermore, the modified electrode was successfully used in spiked human urine and serum samples to determine the GU and AD contents for real time applications.

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1. Introduction

Guanine (GU) and adenine (AD) are two important purine bases of deoxyribonucleic acid, which play crucial roles in the biological synthesis of proteins, cerebral circulation, and cell signaling and even as storage units for biological heredity information.[1] Abnormal changes in GU and AD in nucleic acids create deficiencies and mutations in the immune system, which may cause various diseases including carcinoma, epilepsy, Parkinson's disease, AIDS, and liver diseases.[2] Thus, simultaneous determination of these purine bases has become extremely important for clinical diagnosis. Various techniques such as fluorescence,[3] high performance liquid chromatography,[4] electrophoresis,[5] and surface enhanced Raman scattering[6] have been developed for the detection and measurement of these two purine bases. However, these methods are expensive and time consuming. Moreover, skilled operators are required to handle these large and complicated instruments. Hence, electrochemical techniques[7–9] have been preferred as a perfect alternative to the above mentioned techniques due to their advantages such as high sensitivity, low time consumption, excellent selectivity, fast response, and simple operation.[10–13] However, electrochemical methods have some shortcomings such as overlapping of oxidation peaks and a slow rate of electron transfer. These problems are mitigated by modifying the surface of the electrode with suitable materials. For this reason, the surface of the electrode has been modified chemically to investigate the electrochemical oxidation of these biomolecules. To date, literature reports indicate that many materials such as polyaniline/MnO_2,[14] graphene–Nafion composite films,[15] MWCNT decorated with $NiFe_2O_4$ nanoparticles,[16]

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† Electronic supplementary information (ESI) available: HRTEM image of the PbTe nanoparticles, Tauc plot of the synthesized PbTe nanoparticles, BET analysis of the synthesized graphene, scan rate variation of both the biomolecules at the PbTe/GRGP electrode, effect of the interfering agent, repeatability, reproducibility, and stability of the modified PbTe/GRGP electrode, real sample analysis. See DOI: 10.1039/c7nj03308g

Molecular Imprinted Polymer Based Electrode for Sensing Catechin (+C) in Green Tea

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***Abstract*— Green tea is believed to be a healthy beverage due to a number of therapeutic benefits. Catechin, one of its constituents, is an important antioxidant and possesses free radical scavenging abilities. This paper demonstrates a low cost solution related to the sensing of catechin (+C) using the principle of molecular imprinted polymer technique. Here the electrode was synthesized using the co-polymer of acrylonitrile and ethylene glycol dimethacrylate and was subsequently imprinted with catechin. The material was extensively characterized using Fourier transform infra-red spectroscope and field emission scanning electron microscope, respectively. Cyclic voltammetry and differential pulse voltammetry using the three electrode system were employed for determining the electrochemical characteristics of the proposed electrode. It exhibited a linear range from 5 to 100 μM with the limit of detection of 37 nm (S/N = 3). On studying the analytical characteristics, the electrode was found to be repeatable, reproducible, and offered a good selectivity. Our sensing device was subjected to green tea samples in order to study their catechin content. A partial least square regression model was developed for correlating the response with that of the high performance liquid chromatography data and it resulted in a prediction accuracy of about 92%.**

***Index Terms*— Molecular imprinted polymer, catechin, voltammetry, green tea, partial least square regression.**

I. Introduction

THE recognition of taste attributing agents of tea is extremely important as they have a considerable impact on its export worthiness and commercialization. Green tea leaves are the unfermented leaves generated from the young shoots of the plant *Camelia sinensis* [1]. During its processing, freshly harvested leaves are steamed to prevent fermentation unlike black tea, thereby yielding a dry, stable product [2]. This shorter processing time accounts for their lighter flavour. The intake of green tea is highly advantageous to human health owing to the presence of a number of biologically active polyphenolic compounds called flavonoids [3]. Flavanols, being the member of most diversely available flavonoids, constitutes of two aromatic rings (A and B) linked through three carbon atoms forming an oxygenated heterocyclic ring (C). They are known to possess antioxidant properties due to the presence of the aromatic OH groups [4]. Catechins or flavanol-3-ol is a group of compound comprising around 70% of total polyphenols present in tea leaves. The important catechins present in green tea or green leaf are epigallocatechin (EGC), epigallocatechin gallate (EGCG), epicatechin gallate (ECG), epicatechin (EC), +catechin (+C) and gallo catechin (GC) [5]. The structure of catechin (+C) is shown in Fig. 1. It possesses two different pharmacophores containing the catechol group in ring B and the resorcinol group in ring A. Also, a hydroxyl group is present at position 3 in ring C [6]. Catechin is of immense medicinal value due to its anti-viral [7], anti-allergic, anti-inflammatory [8], anti-carcinogenic [9], and anti-diabetic [10] properties. It also acts as a strong inhibitor of neurodegenerative disorders [11], chelating redox transition metal ions [12] and restrains platelet adhesion. These health benefits of catechin can be accredited to their redox characteristics and free radical scavenging abilities. It permits continuous neutralization of the adverse effects of free radicals by reducing their number [13]. Therefore, a simple, efficient and cost effective detection of catechin is highly imperative for the tea and the pharmaceutical industries.

A number of analytical methods have been reported for the detection and quantification of catechin. These include high performance liquid chromatography [14], spectrophotometry, mass spectroscopy [15], flow column electrolysis [16], flurorescence analysis [17] and chemiluminescence [18]. Though by means of these techniques the results generated are of high precision and accuracy, but they are time consuming, expensive and require skilled operational experts. Also, it is not possible to adapt the techniques by small scale industries located at remote places. Electrochemical detection has been practised as an alternative to these approaches in the recent era, due to their simplicity, fast response time, good sensitivity and selectivity. Ezhil Vilian et al., developed a catechin sensor by modification of the glassy carbon electrode using MnO_2/carbon nanotubes decorated with the nanocomposite of Pt nanoparticles [19]. Also, Manasa et al., employed electrochemical detection of catechin by means of poly (methylene blue) modified carbon paste electrode [4]. Pang et al., used nitrogen doped graphene modified carbon paste electrode as an electrochemical probe for determination of catechin [20].

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Efficient electrochemical detection of guanine, uric acid and their mixture by composite of nano-particles of lanthanides ortho-ferrite $XFeO_3$ (X = La, Gd, Pr, Dy, Sm, Ce and Tb)

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ABSTRACT

Nanoparticles of lanthanides orthoferrites were found to be efficient electrodes for detection of guanine (GU) and uric acid (UA).These perovskite type lanthanide orthoferrite nano particles of $XFeO_3$ (where X = La, Ce, Pr, Sm, Gd, Tb and Dy) were synthesized by combustion techniques using lanthanides nitrate and ferric nitrate as precursor materials in the presence of ethanolamine and sugar as fuel. The powders were characterized by FESEM, TEM and XRD. The synthesized nano particles have orthorhombic crystal structure and have average crystallite sizes ranging from 40 to 45 nm as calculated by Debye-Scherrer equation. The electrochemical activities of these oxides with graphite powder as sensor electrodes were studied for the detection of guanine and uric acid individually as well as in mixture by cyclic voltammetery (CV) and also by differential pulse voltammetry (DPV) techniques and found to be better than reported literatures. The efficient detection of biomolecules may be due to the unique band gap of these ortho-ferrite semiconductors having the bad-gap value around 2.0 eV. The detection limit varies from 100 to 400 nM for guanine and 200 to 500 nM for uric acid at the surface of $XFeO_3$ electrodes. The best electrode was obtained from $LaFeO_3$ with lowest detection limit 100 nM for GU & 200 nM for UA maintaining the linear range from 0.5 μM to 120 μM. All electrochemical experiments have been carried out in the presence of Phosphate buffer solution of pH 5.0 as a supporting electrolyte with scan rate 100 mV s^{-1} and 50 mV s^{-1} for CV and DPV respectively.

1. Introduction

Guanine (GU) is an important purine base of DNA, plays a vital role in protein biosynthesis and the storage of genetic information involved in various purposes like metabolic cofactors, energy transduction and cell signaling [1]. The extreme abnormality of GU level suggests the deficiency and mutation of the immune system which may be the sign of various diseases such as AIDS, carcinoma, epilepsy etc. [2]. Uric acid (UA) is the primary end product of the purine metabolism. Its normal concentration range in human body is 0.3 to 0.5 mM in serum and 1.4–4.4 mM in urinary excretion [3,4]. A normal level of UA serves as a natural anti-oxidant but the excess level indicates the symptoms of various diseases like gout, Parkinson disease, hyperuricemia [5–7], multiple sclerosis, oxidative stress and Lesch-Nyhan [8,9] syndrome etc. Usually UA and GU coexist in physiological fluids. Therefore sensitive, selective and accurate methods for simultaneous determination of these two molecules are very essential for bioscience and clinical diagnosis. For this purpose different techniques like fluorescence spectroscopy [10], high-performance liquid chromatography [11], electrophoresis [12] enzymatic analysis [13] have been developed having some limitations with expensive instruments, skilled operators, tedious sample pretreatments. Hence, the development of electrochemical techniques has attracted the analysts due to its advantages like fast response, high sensitivity, better selectivity and low cost. In some cases low sensitivity and poor selectivity are observed with the traditional electrodes due to the deposition of oxidized products at the surface of the electrodes [14]. To overcome this problem the researchers have attempted to develop nano-materials as an electrode-modifier due to its high surface area, good conductivity, efficient electro-catalytic activity for better sensitivity [15]. As per literature it is

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Methylglyoxal at metronomic doses sensitizes breast cancer cells to doxorubicin and cisplatin causing synergistic induction of programmed cell death and inhibition of stemness

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Application of Polymethacrylic Acid Imprinted Quartz Crystal Microbalance Sensor for Detection of 3- Carene in Mango

Barnali Ghatak, Sk Babar Ali , Amrita Prasad, Arunangshu Ghosh, Prolay Sharma , Bipan Tudu , Panchanan Pramanik , Rajib Bandyopadhyay

***Abstract*— The present study aims to develop a selective molecularly imprinted polymer (MIP) layer combined with quartz crystal microbalance sensor for the detection of 3- Carene, a significant aroma compound of mango. The proposed sensor is prepared from the co-polymer of methacrylic acid and divinylbenzene and it is imprinted with 3- Carene. The MIP template was synthesized and deposited onto Quartz Crystal Microbalance (QCM) platform by proper functionalizing the gold electrode using 2-propene 1- thiol. The developed MIP material is characterized by fourier transform infra-red, scanning electron microscope and atomic force microscope techniques. The sensor offers very good selectivity and sensitivity (1-1000ppm) of 0.11 Hz/ppm to 3- Carene from its structural analogies. The LOD and the LOQ of the sensor are found to be 0.8 ppm and 1.4 ppm, respectively. The performance of the sensor offers satisfactory reproducibility and repeatability to 3- Carene. Moreover, the response of the sensor has been correlated to the standard gas- chromatography-mass spectrometry (GC-MS) data to detect 3- Carene in Langda and Chausa mango.**

***Index Terms*— Molecularly imprinted polymer, quartz crystal microbalance, 3- Carene, mango, gas-chromatography mass spectrometry.**

I. Introduction

Mango (Mangifera indica L.), the 'king of fruits' produces a wide range of volatile organic compounds (VOC) that impart their characteristically distinct aromas and contribute to exquisite flavor characteristics. Mango contains more than 270 VOCs in different mango cultivars [1].

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Generally, terpenes are the major class of compounds present in Asian and Colombian mangoes whereas alcohols, esters, and ketones are found to be responsible for the characteristic aroma of the Asian mangoes [2, 3]. Additionally, it has been illustrated that monoterpenes and sesquiterpenes are the main aroma constituents in Columbian mango, represents 70-90% of the total volatiles present in mango varieties [4-6] with 3-Carene being among the significantly major and dominating terpene hydrocarbons identified particularly for flavor characteristics [6]. M. Lebrun et al. have demonstrated the existence of significant amounts of 3- Carene, α-pinene, β-caryophyllene and ocimene obtained from GCMS analysis of green and ripe Cogshall mango [7]. S.S. Pandit et. al [8] have performed GC-MS and GC- FID analysis on different mango cultivars to establish cultivar relationship based on fruit volatiles. The results reveal the significant contribution of 3-Carene in Langda and Chausa mango. Ansari et al. have also found the qualitative importance of 3-carene in Corazon, Bizcochuelo and Super Haden from Cuba,Venezuela, and Brazil cultivars of mango [6,8,9]. Pino et al. have also investigated 3-Carene as a major aroma-contributing component in some mangos namely Haden, Manga amarilla, Macho, Manga blanca, San Diego, Manzano, Smith, Florida, Keitt, and Kent [6]. Additionally, 3- Carene was found to be the second most copious volatile aroma compound presents in the pulp and peel of Maha Chanok cultivar of mango as demonstrated by Laohaprasit et al. [10]. Thus, it may be inferred from the extensive researches on this domain that 3-Carene plays a decisive role not only for organoleptic sensation but also for its strong aroma matrix in mango [1, 8, 11, 12]

Detection of some odoriferous terpenes including α- pinene and limonene has already been demonstrated in few literatures [13-27]. These reports demonstrate the assessment of α-pinene in Harumanis mango by using interdigitated electrode (IDE) functionalized by the co- polymer of methacrylic acid (MAA) and ethylene glycol dimethacrylate acid (EGDMA) which is further imprinted by α- pinene [15]. The later report by Hawari et al. have used an array of MIP-IDE sensors for assaying terpinolene and ϒ- terpinene in Harumanis mango resulting a good correlation to the fruit ripeness stage [15]. SB Ali et al. [16] have developed QCM sensor for detection of

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Sol-gel synthesis of cubic titanium dioxide nanoparticle using poly(ethylene glycol) as a capping agent: voltammetric simultaneous determination of uric acid and guanine

Sudip Biswas, Susmita Pradhan, Hemanta Naskar, Rajib Bandyopadhyay & Panchanan Pramanik

Microchimica Acta **185**, Article number: 513 (2018) | Cite this article

Abstract

Titanium dioxide nanoparticles (NPs) were synthesized by a sol-gel method from hexafluorotitanic acid using poly(ethylene glycol) as a

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Synthesis and Electrocatalytic Properties of Ni-substituted Co_3O_4 for Oxygen Evolution in Alkaline Medium

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Abstract: *Cobalt based Ni-substituted spinel-type oxides were synthesized by carbonate co-precipitation method using Na_2CO_3 as precipitant and studied their electrocatalytic properties towards oxygen evolution reaction (OER) in alkaline medium. Materials were synthesized by using nitrates of nickel and cobalt. For electrochemical studies, oxide powder was transformed in the form of oxide film electrode on nickel substrate. Techniques used were cyclic voltammetry, electrochemical impedance spectroscopy (EIS) and anodic Tafel polarization. Results obtained show that the Ni-substitution in Co_3O_4 matrix increase the oxide roughness factor considerably but did not significantly contribute in electrocatalytic properties for oxygen evolution reaction (OER). Tafel slope and order of reacton with respect to [OH^-] concentration at low overpotential were found to be ~2.303RT/nF and ~1, respectively. The effect of temperature on the electrochemical behaviopur has also been investigated for oxide electrode. Thermodynamic parameters such as, standard electrochemical enthalpy of activation ($\Delta H_{el}^{0\#}$), standard enthalpy of activation ($\Delta H^{0\#}$) and standard entropy of activation ($\Delta S^{0\#}$) were estimated by recording the Tafel polarization curves at different temperatures. X-ray diffraction (XRD), infrared (IR) spectroscopy and scanning electron microscope (SEM) techniques have been used to characterize the materials physicochemically.*

Keywords: Oxygen evolution reaction, Spinel type oxide, Electrocatalysis, Tafel slope, Roughness factor

1. INTRODUCTION

Transition metal mixed oxides of spinel (e.g. Co_3O_4, $CuCo_2O_4$, $NiCo_2O_4$, etc.) and perovskite ($LaCoO_3$, $LaMnO_3$, etc.) families are considered as promising electrode material for the application in electrochemical devices such as water electrolysis cells, fuel cells and metal air batteries [1-8]. Ni-substituted oxide materials were found to be useful in many electrode reactions from O_2 [9] and Cl_2 [10] evolution to O_2 reduction [11] and also in application to metal ion batteries [12,13]. $NiCo_2O_4$ is generally regarded as mixed valent oxide that adopts a spinel structure in which nickel occupies the octahedral site and cobalt is distributed over both octahedral and tetrahedral sites. But, cobalt electrode of these materials obtained by conventional methods usually have low electrochemically active (or real) surface area and hence the electrocatalytic activity. It is, therefore; desire to improve their specific surface area to the reasonable extent.

The efficiency of these oxide materials can be enhanced by developing suitable low temperature preparative methods based on the knowledge of solution chemistry. The textural characteristic and hence the electrochemical interfacial properties of the oxide electrode can also be changed by the partial replacement of constituent metal ion by suitable transition metal ions. Chi et al. [14] synthesized Ni-Co spinel oxide by using different methods and studied the effect on the physicochemical and electrochemical properties. The lattice parameters, crystallite size (S) and surface composition of the material were investigated by De Faria et al. [15]. Recently, B. Cui et al. [16] synthesized core-ring structured $NiCo_2O_4$ nanoplatelets by hydroxide co-precipitation decomposition method and characterized their electrocatalytic properties for the OER. In general, it is observed that both electronic and geometrical factors influence the electrocatalytic properties of the material. The former are governed by the

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THE LOSS OF THE AESTHETIC PROPERTIES IN THE MOVIE ADAPTATION OF R. K. NARAYAN'S *THE GUIDE* (1968)

Ravi Prakash Dubey*
Pinak Sankar Bhattacharya**

Introduction:

A novel is meant for reading in a relaxed and comprehensive mood, when one can feel and perceive all that the plot has to express. When turned into a movie, it often tends to become the victim of fragmentation and exaggeration; This happens in order to achieve appeal to the audience for commercial profits. One very strong reason for this may be the difference between the target audiences of a novel and a movie. Whereas a novel look for the audience who have cultivated taste, the movie tries to cater to the taste of a variety of audience. The aesthetic properties which are prioritized in a movie and novel are obviously different.

The movie *Guide* (1965) was made in collaboration with an American by an Indian director. It is an adaptation of the novel *The Guide* (1958) which gained fame for R.K. Narayan. The novel belongs to one of the Malgudi Novels. It is a regional novel with a huge appeal to its readers. It revolves round the central character of Raju; and goes onto expose the circumstances in which this character evolves and develops and ultimately achieves a place of love and respect. The novel in written in mixed first person and third person narrative.

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Role of a Teacher in a Multicultural Classroom

*Vivek Mehrotra**

With the speedy growth of education and communication in the modern world of awareness, the concept of multicultural education in all Institutions around the world has become the responsibility of the teachers to plan their lessons to cater to the needs of multilingual and multicultural students. Sharing different cultures, giving values and understanding the unfamiliar matters help the students to come out from racial and ethnic differences. Here the role of the teacher is to dig out professionally the resources from different culture and frame the curriculum to enrich the class with unique experiences to be useful to the society as well. India is an example of 'unity in diversity' each state having different dialects, food habits, costumes and culture. Creativity and organizing skill is required to a good teacher to cater to the needs of each student whose socio economic level, language and community differ from each other. To have multicultural classroom setting, a teacher should move beyond text book and organize cooperative learning by bringing together the students to the exposure of different language culture through group discussions and by sharing knowledge of different culture through role play etc.

The students will accept each other and they very well understand the diversity and its importance. They can identify the roles of schools to prepare students to maintain themselves in fast moving mundane world. The schools are preparing the students for their all round development of balanced personality. The curriculum should be enriched with the knowledge of histories, cultural values, traditional outlooks and above all social justice.

As the population of each nation is becoming increasingly diverse it

Cultural Underpinnings in Gita Mehta

*Dr Mamta Bhatnagar**

Gita Mehta, a creative writer of the Indian Diaspora, has made a place for herself in the galaxy of Indian women novelists by contributing in the form of fiction and non-fiction. Her literary career started with *Karma Cola: Marketing the Mystic East* (1979), followed by *Raj* (1989), *A River Sutra* (1993), *Snakes and Ladders: A View of Modern India* (1997) and *Eternal Ganesha* (2006). Along with this, she has made a noteworthy contribution to literature in the form of articles and interviews.

Gita Mehta has described India from the honest view of a fervent emigrant. The study of her works from the point of view of her elucidation of Indian culture affirms that she is, no doubt, a great promoter of India and its culture. Perhaps her sensibilities for India came to her from her highly patriotic family passionately involved in India's freedom struggle. Her marriage to Sonny Mehta, from New York's publishing circle, took her to America and developed in her the perception of the Indian Diaspora. She often had to satisfy curiosities of the Westerners regarding Indian customs and values. Even before she stepped into the field of writing books, she had directed a number of documentaries about India for BBC and NBC. She narrates in her interview with C. J. S. Wallia, "I would charge into the offices of BBC and NBC and ask them, 'Why don't you let Indians make films about India?' They were astonished and let me do the film" ("India Star Review of Books"). This clearly indicates that Mehta was not satisfied with the image of India as presented to the world. She felt she had a responsibility to represent her land from her personal experience. John Walsh, while reporting his interview with Gita Mehta, calls her "the intelligent voice of India itself, its soul and classy embodiment ..." ("Karma Chameleon").

Flipped Learning: A Literature Survey on why the Approach is in Question

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ABSTRACT

The concept of 'Flipped Learning' came with a change in approach to teaching. Contrary to a traditional classroom, a flipped classroom is seen as student-centred. Initially FL began with supplying online learning materials with easy access for the students absent in the class. It has been effective in supplying all students with learning materials and thus, making them responsible for learning. Class time could be expanded and utilized for one to one interaction. Other advantages are also there. A learner-centred class not only engages learners with their flexibility in learning activity but also promotes collaboration among them.

It spite of a number of advantages, flipped classes are not liked by many of the learners, teachers and parents. Some of the flaws are quite obvious, such as, traditional mindset of learners, teachers and administrators, inadequate technology in low-income schools, learners' dislike and disinterestedness in active participation, larger workload for the teacher in managing students working on multiple assignments of varied standards, standardized testing, and so on.

The present paper is an attempt to provide observation-based detailed insight of how this innovative and technology-driven approach of learning and teaching outside of the classroom with teacher in the role of a facilitator is perceived by the stake-holders, consider pros and cons of this approach in this digitalized era and ultimately to find an answer to why the approach is in question.

Key terms: *Flipped Learning, Student-centred Learning Approach, Learners' Role and Responsibility, Teachers' Role and Responsibility, Perceptions of Stake-holders*

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Gender Stereotype and Representation of Female Characters in Arundhati Roy's *The God of Small Things* and Kiran Desai's *The Inheritance of Loss*

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ABSTRACT

The present paper explores the feminist sensibilities in the novels of Arundhati Roy and Kiran Desai, The God of Small Things *and* The Inheritance of Loss *respectively. This paper tries to analyze how the characters in both the novels are suffering due to the societal imposition of gender on them. The juxtaposition of the patriarchal tyranny at one hand and the fight back against it by the protagonists of the novels form the crux of this research work. Feminine sensibility, as one of the most significant themes, is being treated by the novelists of post-Independence India.*

Keywords: Alienation, gender stereotype, homelessness, patriarchal tyranny, suppression

INTRODUCTION

Arundhati Roy has followed the "Bildungsroman" technique which stretches the story both backward & forward at sudden pace. According to The Oxford companion to English Literature, "Bildungsroman" is

> The German term for "education-novel" (education being understood in broad sense that includes self-formation or personal development), which has a significant sub-genre of novel which

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Item Songs in Hindi Films: A Study in Cultural Shift

Abhishek Kumar Jaiswal

In broader sense item song, an ancient form of "seductive performance" can be reviewed through tribal mores, mythology, imperial era, and masses in cinema. Tribes are primitive form of human life; they are pristine and unspoiled in their way of living. They don't have connection with mainstream social life and technologies. In most of their daily activities they are dependent on natural resources and nature. For example, they hunt for food and wear leaves, plants and animal's skin as dress, and natural coloured beads and bones for ornamentation. With the help of modern technology like camera and video recorder their lives have been studied and made public by devoted researchers. There are hundreds of documentaries, research articles, books and youtube videos that help to understand their social and ceremonial functions. One of them is their sex-and-dance custom life where they imitate nature in the way as animals and birds use special movements that are called mating call for attracting their partner through specific voices, gestures and sometimes dance. In most of the tribes such musical dances are performed for seduction or to entice one into sexual activity. Example can be seen in one of youtube videos of *Bugdet Films Footage* in which African tribal women are shown dancing on

upbeat of tabla and other musical instruments erotically for sexual arousal. Other similar tribal dance i.e. Belly dance, zorba dance can be exemplified as mentioned by Anthony Ashay in his book *Ethno-Identity Dance for Sex, Fun, and Profit: Staging Popular Dances Around the World*: "Ethno-identity dances as a sexually motivated performance is frequently treated as a way of using the female form to attract men, and to objectify women's bodies" (Ashay 26).

Mythology is the treasure of myth and culture related to human race. It is religious and common around the world. Each country has its own mythology consisting of traditional belief which covers all shades of life from birth to death and from spirituality to sin. In Christian mythology *seven deadly sins* and *seven heavenly virtues* have been mentioned with their demons and deities. In general, mythology unveils human psyche one or another way. Despite being the finest race on the earth, human beings have their weakness that can be explored through myth and scriptures. Lust or temptation is one of the strongest limitations that distract humans from their goal. Mythology around the world from Albania to Yoruba has its description with specific events and God. For example, *Succumbus*, a Lilin demon in folklore, takes the form of woman, appears in dream and seduces. Taking reference of seductive performance, my paper studies selective incidents with Indian mythological reference.

The first reference can be seen in the Mohini avatar of Lord Vishnu after getting Amrit (elixir/nectar of immortality) in the churning of ocean (Sagar Manthan) collaborated by Devta (God) and Asur (Devil). It was planned to share half of the nectar in both the groups of God and Devil but God did not want to make demons immortal. So, Lord Shiva, Bramha, Indra and other Gods asked lord Vishnu to help them and the

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Virtuous Engineering is the Need of Hour: A Perspective for Civil Engineering Research

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Abstract

The best quality of someone or something that creates something valuable can be considered as virtuous. The present article frames the engineering ethics, what I call the virtuous engineering, from the civil engineering perspective. Civil engineering can be comprehended in the sense of imagining, innovating and creating such structures and designs which not only make social life more convenient but also civilized. The engineering skills and virtues it involves in its engineering designs and structures represent the character of the society. From the ancient Giza Pyramids to the latest Qingdao Halwan Bridge all narrates the beauty, virtues, skills, techniques, challenging will and civil engineering attitude of their societies. The article construes the ethical enhancement in the civil engineering as a mark of social developments. The article is innovative and explorative in its analysis in the fashion it involves engineering ethics, aesthetics and socio matrix in understanding the civil engineering creativity.

Keywords: Engineering ethics; Engineering creativity; Utilitarianism; Virtue theory; Deontology

Introduction

Aristotle defines about the virtues as characteristics having their purpose to achieve what they aimed to. And, when we are virtuous in terms of what we do actually we realize a state of mind filled with happiness that's what he calls Eudemonia. Engineering creations in general and civil engineering in particular have to focus on this engineering ethics as it is the need of hour to maintain a grater balance of good through engineering creativity. The mantra of any industrious act, whatever it involves whether the engineering or the business corporate proceedings, is to maintain the Triple bottom line:

1) People,

2) Planet and

3) Profit.

Following the same line of thinking the paper has a vision of civil engineering in which it defends that the civil engineering is not only an act of engineering but also it represent the social character. Hence, the great civil engineering designs, structures, and achievements all they act as representative benchmarks for the society and to the idea of social development. The emphasis has been put more on the ethical side of civil engineering in a manner it really involves the ethical ideas to make social life civic by providing such civil engineering creations that give to society a morally better and healthy life; let's talk about the very basic concept of room having doors and windows what these structures facilitates in terms of making a better moral life that is having privacy with the choice of exposure. In this explorative effort I shall be concluding with the remarks that the future of civil engineering is of Green ethical engineering which encapsulates the virtuous creativity, Happy Society and Environmental Safety.

Civil Engineering as Virtuous Engineering: Understanding from Giza to Qingdao Halwan Bridge

From the ancient time creativity has been shaped by the human mind through natural beauty and its underlying aesthetic philosophy. However, there is a gradual fall down in this kind of engineering thinking. And it has alarmed us to restructure the engineering view before we imagine creating any technology, machine, design or structures. The need of hour is the virtuous engineering modal which not only encompassing the basic engineering skills but also the engineering ethics that it should be in order to facilitate a society in making the social life more convenient, civilized, and healthy. Let's talk about the Giza Pyramid; the oldest civil engineering wonder of the world. Alexander writes:

In the ancient world there once stood seven wonders, seven monuments of the ingenuity of men. The civilizations fell, and those wonders crumbled to dust, lost in the sands of time all

Cultural, Linguistic and Diasporic Identity Crises in Jhumpa Lahiri's *The Namesake*

Swagat Patel

Introduction

In the novel, *The Namesake*, when Ashoka Gangly marries Ashima and moves to America from Calcutta, they became the first generation of immigrants and get caught hanging between two cultures, struggling to find a root for themselves. A psychological oppression is a natural outcome in their search for an identity in the new world. They are caught in the cultural dilemma of not being able to discard their own native one and not being able to accept, and not being accepted by, the new one. They are hanging between self-chosen up rootedness from the native culture and uncertain re-rootedness in the alien culture. Such diasporic consciousness is a highly complex one as it contains the experience of an exilic existence, of a sense of loss, and of being an outsider longing for home. It has the added burden of certain dispossession and uncertain relocation. They experience a sense of up rootedness and loneliness in the host nation. Despite their attempts of acculturation, they are treated as outsiders. These diasporic people, in a bid to have solidarity, form their own immigration colony which naturally becomes an amalgamation of old and new cultures. The second generation of immigrants, represented by Gogol, Somali and Mosheim, though have struggled much less as compared to that of the first generation as they have been somewhat accultured in the new world, still face crisis in matters relating to their personality, identity and adjustment in an alien land and are usually branded as ABCD (American Born Confused Desi).

Name and Identity

Names are very important in a person's life. Persons are identified through their names. It is through one's name that the whole world seesoneself. This is the reason why Eshima was not discharged from the hospital without naming her child as the name has to be recorded by the Birth-certificate compiler. The Bengali tradition of pet names, or daknam and "good" names, or *Bhalonam*, is explained to the birth certificate compiler. Only close family uses the pet name at home, while the "good" name is used in formal situations like school and work place. Ashima and Ashoke have to give their son a pet name as they wait for the "good" name supposed to be arriving from Ashima's grandmother. But, as we discover later, the letter from Calcutta never comes. Ashoke names his son Gogol after a Russian writer named Nikolai Gogol.

The theme of name and identity is important in Chapter 3 also, when Gogol starts kindergarten. His parents intend him to go by "Nikhil" at school and "Gogol" at home, but Gogol gets confused and doesn't want a new name: As a child, he associates a new name with a new identity. Gogol's school Principal sends a note to the parents that "Due to your son's preference, he will be known as Gogol in School". Ashima tells Ashoke that they cannot do anything about this because in America children decide.

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The Trauma of Slavery and Patriarchy in the novels of Toni Morrison

Sula and *Beloved*

Abstract

The present paper is to analyze the portrayal of women by the society in which women are to come up with the definition of a good woman. Society puts all the regulations and limitations only for women, if the women would go beyond those limitations for accomplishing liberty, the society would not accept her and starts accusing her for going against the social norms. This paper represents women's contribution in making that picture of women and accepting it because they are also the part of the patriarchal society. But on the other hand women have also shattered the stereotyped image of women formed by the patriarchal society in order to attain liberty.

Key words: Patriarchal society, portrayal of women, stereotyped image, limitations

Introduction

What is a woman? This question is critical, but the answer is very simple in the words of Simone de Beauvoir, who stated that: "She is a womb, an ovary; she is a female: this word is enough to define her. From a man's mouth, the epithet "female" sounds like an insult; but he, not ashamed of his animality, is proud to hear: "He's a male!" (Beauvoir 41). At the time

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Dr Prateek Pandey

Introduction

In India, the novel was not having the similar historical background as in Britain; it had different forms and understanding. The ancient India had the tradition to pass on the legacy of wisdom to the upcoming generation through story telling. It was a social playful act. The roots of such fiction are traced back during the days of the Ramayana and the Mahabharata by Valmiki and Vedavyasa. The different conventional modes of narratives prevalent during those periods were prose Chronicles (akahyayika) romantic talk (Katha), an episodic story (Upakhyana) an episodic story sung and enacted by a bard (abhiney) didactic bird and beast fable (nidarsara) a story in dialogue from (Pravathika), a story satirizing society (Matallika) a tale narrations several adventures (parikatha) a partially narrated well known story (Khandkatha) etc, These were not really novel in complete sense as per the standard set by the definition of Novel.

Novel started breaking the old traditional belief of idealizing the hero worship. The romantic attitude of people was making them self-dependent for survival issues. Contrary to earlier times when religious doctrines and institution were more governing the action of person in society. The society started observing shift from utopian concept to realism and individualism due to scientific discoveries, which were establishing the faith in human power. Subsequently, all the transitions were reflecting in the Genre. As an impact, People were more interested to read about their contemporary socio-economical realities. On the other hand in India, it was used to criticize the social evils.

It was more of a capitalist tool than a literary tool. This is self evident in the tendencies of the famous novelists during 19 century who published chapters of their novels in magazines and news papers for their audience's response. It was food for thought for the authors. Now since, the new life was creating an environment, attitude and culture. It was forming a class which produced commodity, used it and was as a commodity in the hands of the capitalist class.

The manufacturing and distribution of the middle class ideology to prepare this class had already been rooted in the 18th century which is depicted through the novels like *Amelia* by Henry Fielding (1751), *Things as They are, or The Adventures of Caleb Williams* (1794) by William Godwin, *The Adventures of Hugh Treror* (1794-1797) by Thomas Holcroft and *Nature and Art* (1796) by Elizabeth Inchbald. These novels were found talking about the down fall of morality, the growth of self centeredness and corruption as the common somewhere it was creating these thought process to be trends. And happening related to these issues as acceptable not something which is morally challenging to digest.

The mechanized system of Industrial societies was to run on the concept of consumerism. The capitalist class was not only to focus on the production of goods but simultaneously had to create people's ideology of consumption as the concept of progress. The capitalist model constructed each

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Ideology and Stigma of Patriarchy in Kiran Desai's *The Inheritance of Loss* and Mahasweta Devi's *Mother of 1084*

DIMPAL PAHWA, PRATEEK PANDEY AND ANUP GUPTA

ABSTRACT

This paper attempts to analyse the norms of patriarchy due to which the female is victimised more in comparison to the male. It explores male domination over the society, which always places men in the center and springs opportunities for them to make their identity. Men have control over decision making, women's productive and reproductive ability as well as their sexuality. It also demonstrates how patriarchy affects the family, relation of men and women, and economic condition of women. It also analyses how female participates in this system by accepting the norms of patriarchy because they are taught to be dominated by male.

Keywords: Patriarchy, male domination, male centered, male identified, control and fear.

INTRODUCTION

In our society, many reasons exist behind the women's suppression but in this research paper, which uses empirical research methodology, the focus is on hierarchic system of patriarchy, and its ideology. This structure of patriarchy damages the gender equality, by giving priorities to the male, and placing the female as secondary. Patriarchy is a social system in which the authority is given to the eldest male of the family i.e. the family is directed according to the rules of the father over his children and wife. In this hierarchic system of patriarchy, the

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ETHICAL THEORY & BUSINESS

A study based on *Utilitarianism* and *Kantianism*

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1. Introduction

A Lingering difficulty in the field of business ethics is the acquisition of a stable and appropriate theoretical base. The feeling one gets from the literature (texts, articles, books) and current business experience is that despite the traditional and important ethical theories (*Deontology* and *Consequentialism*), business people are facing problems while practicing these theories to resolve the business complexities, making policies and taking decisions because of their disparate and absolute nature. Consequently, *eclecticism* seems to dominate over the need for focus and securing of a common foundation. The presentation of ethical theory in the literature of the field is almost unpredictable, although *Deontology* and *Consequentialism* seems hard to ignore. Many authors also include such perspectives as egoism, virtue theory, theories of justice, theories of rights, universalism, ethical relativism, an ethic of caring, and so on. The theoretical foundations of business ethics, therefore, are not secure; the dominant interest in the field seems inclined toward building a diversity of perspectives, as opposed to identifying a common core of theory.

The objective of this paper is not to construct another ethical perspective but put together these two major traditional ethical theories (*Deontology* and *Consequentialism*) in such a fashion, which can be appropriate and productive to guide the current business practices.

textual meanings, enabling the readers to understand the text and the world, yet the analysis is purely textual, with few speculations about the psychology of the interpreters. The reader's reception of the texts that have been analysed would have supported Jeffries claims, demonstrating their psychology and discourse processing. Another issue is that even though the different types of opposition have been very well described and explained, there is no mention of how they can be employed in language teaching. However, I believe that the study of opposites has direct relevance for language teachers and educators. If opposites can be taught contextually through authentic texts such as newspapers, magazines and political speeches by focusing on their type, use and function rather than through wordlists, then the simple topic of opposition can enrich the way in which learners think and respond to texts and the world around them. The work thus, has a wide appeal and can be of interest to college level students and teachers at the school or university levels in the fields of linguistics, language education and literature.

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Website Review

Teaching Poetry: A Review of Some Websites

Shreesh Chaudhary

Poetry is perhaps the oldest and most popular genre of literature globally. Yet poetry remains under-utilized in language classrooms and also a source of lot of anxiety. In India, poetry is taught mostly as a part of literature component in the syllabus. However, can it also be used in the "language" classrooms? Can it be used for teaching language? How can it be best taught for its own sake? Is it possible to teach how to write poetry? Is it possible to create among students a liking for (English) poetry? These are some of the questions that fuel our anxieties in using poetry to teach language. At the center of this anxiety is the asymmetry that use of language purely for informational purposes has over using language for aesthetic reasons in classrooms. There is a change coming; research shows that our knowledge of language, among other things, includes our ability to decode sentences, but 'motivation' plays a central role in language acquisition. With this awareness there has arisen a not too-well articulated but an ever-growing need in language classrooms in India for new material that is both authentic and interesting. Poems as songs have always answered this need. Today they are available easily and aplenty at the Internet.

When we google the words "Teaching poetry" the site of the Poetry Society of the United Kingdom comes up right on top. This site gives the "Top Tips for Teaching Poetry"[1]. Closely following it at number two is the site of the American Academy of Poets, which offers "Tips for Teaching Poetry"[2]. The first page of the result of the search "Teaching poetry" also gives links to other popular sites. These are:

INTERFACE IN ... MY YEAR OF MEATS

Yogeshwar Dwivedi*

When the all-powerful Meg in Harold Pinter's The Birthday Party had proclaimed that she was the belle of the ball for Stanley's kidnapping, it was hard to gulp the growth of woman who was earlier cursed by her father - Jessica in Shakespeare's The Merchant of Venice was equated with the wilderness of monkeys for her sin was a theft. Obscurity isn't in the curse but on the object of it – the monkeys, or Jessica, or both at the same time? The scales of balance remain unturned even in Ozeki's My Year of Meats. The present paper through ecofeminist lens attempts to recognise underlying master model and lexicon that show the interconnectedness between women and environment. The issue of beef raised in the text interlinks women, animals, and environment as objects of oppression while at the same time, it exposes similar ideologies of patriarchy which manipulate women and animal as does a conjurer.

Key Words: *Ecofeminism, androcentrism, women, animal, environment*

The issue of the linked oppression is one of the crucial areas in ecocritical study. The advocates of this interdisciplinary theory have identified the oppression of women and animal as linked casually. Such a linked perspective of oppression, categorising its approach as 'ecofeminism', theorises animal rights from feminist perspectives. Ecofeminism as social movement relates the oppression and domination of all the marginal categories such as women, animals and

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Teaching outside the Teaching Machine: Analyzing and Adopting Geoffrey Kendal's Approach towards English Plays

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Introduction

English Language Teaching is younger than the desire to learn English in Indians. Many methods of English language teaching have been developed in less than a century. This paper is written based on an experiment done at the GLA University Mathura to teach English language to select students of B.Tech. Second Year, Mechanical Engineering.

The paper is divided into two main parts. The first part deals with an approach developed by Geoffrey Kendal. This approach maintains that training in theatre can be a tool for teaching English. The second part reports, elaborates and analyses the experiment done to teach English to students with the help of the approach explained in part one.

English plays are more often read as play-texts in Indian schools, colleges and universities rather than as stage-texts. When the students of English literature write about the plays, the resultant is mere textual comprehension, instead of the theatrical one. Such a practice mars the appreciation of the genius of the playwrights. In this context, the British director-actor Geoffrey Kendal (1909 – 1998) and his professional repertory theatre company, *Shakespeareana*'s methods of introducing English plays, specifically Shakespearean plays, to the educational institutes of India could be seen as an essential supplement for the comprehension of English plays. Generating the discourse of teaching outside the teaching machine by allowing it to re-acquire its interdisciplinary nature, Kendal has thus served a purpose of initiating fresh discussions in the recent times. A student of literature feels lacking in sufficient tools of understanding if s/he seeks to remain within her/his own discipline. The way one approaches the social sciences for answering various unsolved questions, s/he may also have to consult the performative aspect for similar reasons.

Tale of the Locale

In the first half of the British rule, India observed the first staged version of English plays. The performance of Shakespearean plays in Bombay (now Mumbai) in 1770 and in Calcutta (now Kolkata) can be treated as

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Cloning and characterization of *MAP2191* gene, a mammalian cell entry antigen of *Mycobacterium avium* subspecies *paratuberculosis*

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ABSTRACT

The aim of this study is to identify, clone and express a *Mycobacterium avium* subsp. *paratuberculosis* specific immunogenic antigen candidate, in order to develop better reagents for diagnosis and vaccines for the protection of the host. Therefore, *MAP2191* gene (a member of MAP*mce*5 operon) from MAP, was isolated and characterized by Bioinformatics tools and *in vitro* experiments. Then, a novel Mce-whole protein encoded by *MAP2191* gene was amplified and sub-cloned into *E. coli*. We tried to express the Mce/whole protein in different condition along with a positive expression control (pET28a-Mce/truncated plasmid that we know express well), to ensure that nothing is wrong regarding culture/induction condition. The level of the recombinant protein expression was analyzed by means of SDS-PAGE and Western blotting. Western blot analysis toward full-length MAP2191 protein and its truncation only demonstrated Mce/truncated protein. The concurrence of *in-silico* prediction of primary structure of MAP2191 protein results along with experimental results confirmed that expression of Mce/whole protein was affected by the hydrophobicity nature of this protein. Our data support the hypothesis that the presence of hydrophobic regions in protein structure can influence the level of recombinant protein expression. This stresses the importance of gene selection and the protein sequence checking of the hydrophobic content in any protein purification project in order to achieve a large amount of desirable proteins.

Keywords: Johne's disease; Control; *mce* gene; MAP2191; Hydrophobicity

INTRODUCTION

Johne's disease (JD) or paratuberculosis is a chronic infection of the intestinal tract of animals, which is caused by *Mycobacterium avium* subsp. *paratuberculosis* (MAP) [1, 2]. JD is primarily a disease of ruminants (cattle, sheep, goats, buffaloes etc.), but can affect non-ruminants, especially wildlife [3, 4]. High to very high prevalence of JD has been frequently reported from dairy farms world-wide [5, 6]. JD is recognized as an important public health pathogen duo to the presence of live MAP bacilli in animal milk (both raw and pasteurized) and other dairy products [1,2,7]. There are potential association of this multi-host pathogen with

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Original Article

Identification of Phytoconstituents in *Lawsonia inermis* Linn. Leaves Extract by GC-MS and their Antibacterial Potential

Ritesh Kumar Sharma[1,*], Anjana Goel[2]

ABSTRACT

Background: Plant extracts contains multiple active constituents which leads to the production of new drugs from plants and chemicals derived from various parts of plants. The objective of present study was to investigate the GC-MS analysis and antibacterial activity of L. *inermis* leaves extracts. **Material and Methods:** Crude methanol extract and its fractions were tested for the presence of active phytochemicals and GC-MS analysis of hexane; ethyl acetate and aqueous methanol fractions was performed. Antimicrobial activity against six bacterial strain's *Escherichia coli, Staphylococcus aureus, Bacillus subtelis, Salmonella typhi, Klebsiella* and *Pseudomonas aeruginosa* was also tested. **Results:** Phytochemical screening of extract confirmed the presence of carbohydrates, glycosides, quinones, steroids and phenol. In GC-MS chromatograms, 56, 108 and 19 peaks were obtained and out of these, 13, 17 and 7 compounds were identified in hexane, ethyl acetate and aqueous methanol fractions, respectively. **Conclusion:** For best of our knowledge in L. *inermis* leaves extract, Celidoniol and Vitamin E has not been reported earlier in hexane fractions. While 2, 3 dihydrobenzo furan, 1-H indole -1, 3 (2H)-dione, 1 (3H)-Isobenzofuranone, 1H Isoindole-1, 3 (2H) Dione, Napthelene, 2 ethoxy, 2 (4H) Benzofuranone, Vitamin E, Benzene, 1 isocyano 4 methyl are also identified for the first time in ethyl acetate fraction. Also, in aq. Methanol fraction 1(3H)-isobenzofuranone, Squalene and Vit E were not previously identified. Highest antibacterial activity was confirmed in crude methanol extract which might be due to all the antibacterial compounds present in its fractions. The present study helped in identifying phytoconstituents present in the extract and its fractions which are responsible for various biological and antibacterial activities.

Key words: *Lawsonia inermis* Linn., Methanol extract, Lawsone, 1,4 Napthelenedione, Antimicrobial activity, Medicinal plants.

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INTRODUCTION

Since the beginning of human civilization plants are used by mankind for their therapeutic values.[1] The books on the ayurvedic medicine such as 'Susruta samhita' and 'Charak samhita' refer to the use more than 700 herbs, which are now becoming an important part of daily life despite the progress in modern medicinal and pharmaceutical research.[2-3] Plant extracts contains multiple active constituents, unlike modern medicine that invariables comprise single active ingredients, presenting herbal cocktail showing synergistic and less side effect. It leads to the production of new drugs from plants and chemicals derived from various parts of plants.[4-5] A wide variety of secondary metabolites such as tannins, terpenoids, alkaloids and flavanoids are present in plants, which show antimicrobial properties,[6-10] resulting their use as ethno medicine in different countries around the world.[11-13]

Indian continent is blessed with 120 families and 130000 species of plants. Many of these are known to have medicinal properties. From historical time, various parts of these plants have been used in treatment of communicable as well as non-communicable diseases. However, the bioactive phytoconstituents contributing to antimicrobial properties are yet to be discovered.[14]

As from the above, it can be easily understood that some medicinally and pharmacologically important active ingredients play an important role in the biological activities like antibacterial activity of plants. Herbals are a rich source of active ingredients and can be safer and cost effective treatment for skin diseases ranging from rashes to dreadful skin cancer.[15] To well document their role, several researchers are investigating the biological activities of several plants, which are leading to the development of many synthetic antibiotics.[16]

Genus *Lawsonia* have only one sps. *Lawsonia inermis* Linn. common name Henna/Mehndi.[17-18] Prominent areas for the growth of *L. inermis* Linn. are tropical regions of Asia, America and Africa.[8-19] This plant is mignonette tree[20] belong to Kingdom- Plantae, Division- Angiosperm, Class- Dicotyledon, Order- Myrtales, Family- Lythraceae, Genus- Lawsonia,

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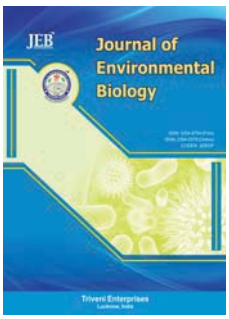

Impact of protozoan *Vahlkampfia* sp. on the growth of algae *Chlorella vulgaris* glamtr

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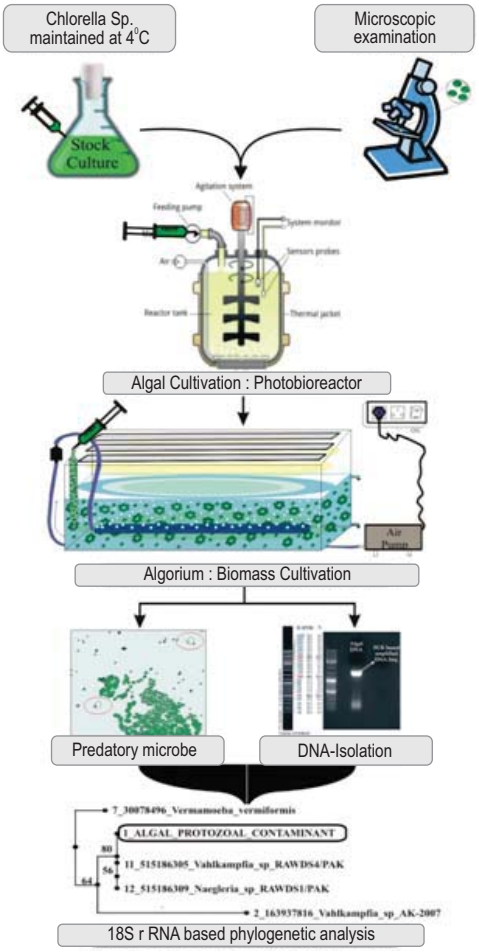
Abstract

Aim : Maintenance of high-density microalgal culture forms the basic feature of algal biofuel technology. Algal biomass cultures explore few microalgal species over the other exposing these to grazers, pathogens and predators. So there is an urgent need to explore technologies that will permit early detection and control of these parasites. The present study reports a predatory microbe which hampered *Chlorella vulgaris* glamtr (Accession no. KX363808.1) biomass productivity.

Methodology : Growth conditions for alga *Chlorella vulgaris* glamtr were optimized by varying temperature (24-25°C; 27-28°C; 31-32°C), pH (6.4-6.8; 6.8-7.2; 7.2-7.6), light intensity (1900; 2400; 2700 lux) and CO_2 concentration (1-5%). Growth kinetics was recorded at 750 nm. Algal biomass was cultivated in RW 1-170P-photobioreactor system and aquarium. The purity of culture was assessed by microscopic examination at 45X. Contaminating protozoan was identified using universal primer (ITS-1 & ITS-4) based amplification of 18S rRNA sequence and its subsequent phylogenetic analysis using MEGA7.

Results : *Chlorella* exhibited optimum growth at 27-28°C, pH 6.8-7.2, light intensity 2700 lux at 5% CO_2 concentration. Microscopic examination revealed predatory nature of contaminating protozoan. ITS-based PCR amplification and subsequent phylogenetic analysis revealed the protozoan to be *Vahlkampfia* sp. Effective subculturing and prevention of protozoan contamination was found to enhance biomass production by 42%.

Interpretation : The study reveals that the protozoan *Vahlkampfia* sp. is a potential predator of microalgae. Prevention of amoebic contaminant and maintenance of optimum environmental conditions could enhance biomass productivity, facilitating algal cultivation.



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Original Article

Antiepileptic Effect of Nux vomica, Homeopathic Remedy, Against Strychnine-Induced Seizers

Anjana Goel[1*], Aditya Saxena[2], Ashok Kumar Bhatia[3]

ABSTRACT

Objective: To investigate the antiepileptic effect of homeopathic remedy Nux vomica on mice and its comparison with standard therapeutic diazepam. **Methods:** BALB-c mice were taken and divided into three groups comprising ten mice in each group. The first group was treated as control; the second group received standard therapeutics (diazepam, i.p.) and the third group received Nux vomica CH7. All groups were treated with strychnine intra peritoneally. Following parameters were observed; start time of convulsions, the number of animals had convulsions, and survival time until death. **Results:** Nux vomica CH7 homeopathic preparation was found effective in suspending onset of convulsions ($P< 0.01$), and extending survival time until death ($P< 0.01$) in comparison to control mice. It also increased percentage survival in comparison to control as well as diazepam treated animals. **Conclusion:** Our study demonstrated efficacy of Nux vomica in epilepsy management.

Key words: Nux vomica, Strychnine, Anticonvulsant, Epilepsy.

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INTRODUCTION

Epilepsy affects over 50 million people worldwide, and over 10 million people in India.[1] its prevalence is about 1% in Indian population,[1] which is almost three times higher in rural population compared to the urban population.[2]

Epilepsy includes various neurological disorders in which neuronal activity get disturbed resulting in severe agitation and convulsions.[3,4] One specific type of convulsions, affecting both hemispheres of the brain is the *Tonic- Clonic seizures* that include a *Tonic* phase of 10-30 sec;[5] during this period, retrenchment of limbs is observed that is followed by their extension. This phase is followed by a *Clonic* Phase in which limbs shake in unison.

At the molecular level, epilepsy is attributed to disturbance in Inhibitory Post Synaptic Potential (IPSP) by inhibitory neurons. These neurons use inhibitory neurotransmitters like: Gamma aminobutyric acid (GABA), and glycine. Receptors for both these neurotransmitters are ionotropic receptors containing two binding sites one for the neurotransmitter itself and a Cl^- channel. Binding of neurotransmitters to their receptors cause the Cl^- channel to open. Opening of the Cl^- channel allows a larger number of chloride ions to diffuse inward causing *hyperpolarization* and an IPSP is generated that inhibit nerve conduction.

Epileptic agent strychnine has been demonstrated to bind and block these receptors and hence inhibits IPSP. It results in contraction of all skeletal muscles, including the diaphragm for extended duration. As a result diaphragm cannot relax, the victim cannot inhale, and suffocation occurs.[6]

Treatment of epilepsy in conventional therapy includes therapeutics like midazolam, lorazepam, phenytoin and diazepam. Diazepam is a medication of the benzodiazepine family that is commonly used to treat a range of conditions including anxiety, alcohol withdrawal syndrome, benzodiazepine withdrawal syndrome, muscle spasms, seizures, trouble sleeping, and restless legs syndrome.[7]

Protective action of diazepam against strychnine-induced seizures is attributed to its positive effect on GABA-mediated IPSC.[8] but usage of diazepam has been reported to show side effects like sleepiness and trouble with coordination.[9]

Homeopathic system is a holistic system of therapy but since its inception, it received severe criticism from scientific community due to non-measurable amount of drug substance in the homeopathic dose. Still homoeopathy has benefitted globally millions and billions of people, a fact that does not require any citation. In case of epilepsy management, there are several homeopathic remedies reported in scientific publications as well as homeopathic literature.[10,11,12,13] Homeopathic remedy Nux vomica has also been reported to affect entire gray matter of the Cerebrospinal Nervous System (CNS), especially centering upon tubular gray matter of pons, medulla, and cervical portion of spinal cord.[14]

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Immunomodulatory activity of *Neolamarckia cadamba* (Roxb.) Bosser with reference to IL-2 induction

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Neolamarckia cadamba (Roxb.) Bosser syn. *Anthocephalus cadamba* (Roxb.) Miq., an evergreen tropical tree, known in Hindu Mythology, for its various medical properties. In the present study, immunomodulatory potential of *N. cadamba* has been investigated in Wistar albino rat model. The effect of hot aqueous extract (HAE) of *N. cadamba* leaves over differential leukocyte count and humoral immune response was assessed using four groups of six animals each (Gp-I as control, Gp-II orally fed with 125 mg/kg body weight, Gp-III orally fed with 250 mg/kg body weight and Gp-IV orally fed with 500 mg/kg body weight of HAE of *N. cadamba* leaves). Differential leukocyte count (DLC) was measured in blood, collected from retro-orbital plexus of rats of control and experimental groups. *In vivo* humoral immune response was determined by estimating the serum antibody titer against *Salmonella typhimurium* 'O' antigen using indirect ELISA. Interleukin (IL)-2 was assayed by sandwich ELISA in presence of different concentrations of HAE (20-500 µg/mL) in the culture supernatant of splenocytes and its expression was determined by quantitative reverse transcription real-time PCR (qRT-PCR). Results suggested significant increase ($p < 0.01$) in lymphocytes (%) of animals orally fed with different concentrations of HAE of *N. cadamba.* Serum antibody titer was also significantly increased ($p < 0.05$) in *N. cadamba* fed animals. IL-2 level was augmented significantly ($p < 0.01$) in Concanavalin A (Con A) stimulated *in vitro* splenocytes culture of 250 µg/mL and 500 µg/mL HAE treated animals in comparison to controls. IL-2 expression was confirmed at molecular level by qRT-PCR analysis of mRNA transcripts of IL-2 gene. Fold expression of IL-2 gene was 28.84 and 330.84 at 250 µg/mL, 500 µg/mL concentrations of HAE respectively in comparison to control. It is concluded that HAE of *N. cadamba* leaves is a promising drug with immuno-stimulant properties.

Keywords: RT-PCR, Interleukin-2, Humoral immune response.

IPC Int. Cl.[8]: A61K 36/00, A61K 38/20, C12N 15/24, C12N 15/25, C12N 15/26, C12N 15/117, c07K 14/54

Over the past century the modern and western medicine has revolutionized healthcare of humans and animals in the world, but still large percentage of populations in developing nations depends on phytomedicines[1]. Recently, Golden Triangle Partnership (GTP) program jointly by ICMR, AYUSH and CSIR has been initiated for validation of traditional *Ayurvedic* drugs/formulations and new drug development from Indian plant species[2].

Neolamarckia cadamba is one of evergreen tropical tree belongs to the Rubiaceae family, closely associated with the life of Lord Krishna (Hindu Deity) and has been used in folklore medicine to treat fever, uterine complaints, anaemia, blood diseases, skin diseases, eye inflammation, diarrhoea, leprosy, dysentery and stomatitis[3-8]. It contains the number of phytochemicals and secondary metabolites (viz., cadamine & isocadamine[9], 3β-dihydrocadambine & 3β-isodihydrocadambine[10], aminocadambine A & B[11], neolamarckines A & B[12], chlorogenic acid & β-sitosterol[13]) responsible for its various biological and pharmacological activities such as antiplasmodial[14], analgesic[15], antidiabetic[16], antioxidant[13], antipyretic[17], anticancer[18] and antimicrobial activities[19,20].

Modulation of host immune responses, to increase clearance of contagious agents and to reduce tissue damage due to inflammation, is the fundamentally new strategy for the cure of infectious diseases[21]. Phytotherapy might be useful to treat the diseases occurring due to dysfunction of immune system

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Melatonin improves *in vitro* maturation and subsequent embryo development of caprine oocytes*

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ABSTRACT

The aim of the present investigation was to study the effect of melatonin on *in vitro* maturation and subsequent embryo development of caprine oocytes. In experiment 1, 384 *in vitro* matured oocytes were selected and randomly divided in to two groups, viz. group 1 (control) wherein oocytes matured in maturation media without supplementation for 27 h in humidified atmosphere at 38.5 C with 5% CO_2 in CO_2 incubator while in group 2 oocytes matured in maturation media with 30 ng/ml melatonin supplementation. After 27 h of culture, nuclear maturation was observed in both groups using Hoechst dye. In experiment 2, 1,336 oocytes were randomly divided into two groups, viz. group 1 (641) wherein oocytes were matured in maturation media without melatonin while in group 2 (n 695) oocytes matured in maturation media with 30 ng/ml melatonin supplementation. After 27 h, oocytes of both groups were then subjected to *in vitro* fertilization.The rate of nuclear maturation in group 2 (30 ng/ml melatonin) was significantly higher than that of group 1 (control). Similarly, the cleavage rate and blastocyst formation from *in vitro* matured goat oocytes were significantly higher in group 2 than that of group 1. In conclusion, the result indicated that the supplementation of 30 ng/ml melatonin in maturation media improves the nuclear maturation and subsequent cleavage rates and blastocyst production from caprine oocytes.

Key words: Blastocyst, Caprine, Embryo development, *in vitro* maturation, Melatonin, Oocytes

The manipulation of embryos during *in vitro* culture at ambient oxygen concentrations carries the risk of exposure to high levels of reactive oxygen species and free radicals, which adversely affect early embryonic development. Melatonin (N-acetyl-5-methoxytryptamine) is the main product secreted by the pineal gland and it also acts as an antioxidant, free radical scavenger and anti-apoptotic producer of developmentally competent embryos.The oxidative stress could be decreased by the antioxidant or radical scavenger in *in vitro* culture medium resulting in stimulation of culture conditions. Melatonin has been successfully tested as an antioxidant for promoting *in vitro* embryo development in bovine (Manjunatha *et al.* 2009). Since melatonin can rapidly pass through cellular membranes, every cellular organelle is exposed to this chemical messenger. This hormone directly destroys free radicals and indirectly by stimulating the antioxidant enzymes and inhibition of per-oxidation enzymes such as nitric oxide synthetase, acts as antioxidants (Galano *et al.* 2011, Zeebaree *et al.* 2018).

Part of Ph.D. thesis.

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In addition to its benefits to *in vitro* maturation and early embryo development, melatonin might have a beneficial effect on embryo pre-implantation development because of its capacity as a radical scavenger, to protect embryonic cells from oxidative stress.Therefore, the present experiment was undertaken to study the effect of melatonin on *in vitro* maturation and subsequent embryo development.

MATERIALS AND METHODS

All organic and inorganic chemicals were purchased from Sigma Chemicals Co. unless otherwise stated.

Experiment 1: Assessment of morphological and nuclear maturation rate of caprine oocytes at 0 ng/ml and 30 ng/ml melatonin.

Recovery of oocytes: Goat ovaries (149) were collected from the local abattoir at Agra and transported within 4 h to the laboratory in warm saline (35–37 C), containing 100 IU penicillin-G and 100 g streptomycin sulfate per ml. Oocytes were retrieved by slicing of the goat ovaries. Recovered oocytes were graded as per Kharche *et al.* (2008).

In vitro *maturation:* Selected cumulus oocyte complexes (COCs) were washed 8 to 10 times in 50–100 l drops of oocyte holding medium (OHM) and subsequently 2 to 3 times in 50 l drops of oocyte maturation media.Oocytes were randomly divided into two treatment groups on the basis of concentrations of melatonin added i.e. group 1

Optimization of caprine embryo production in different media for generation of embryonic stem cell-like cells.

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Abstract : The aim of the present study was to optimize the production of blastocyst for obtaining caprine embryonic stem cell-like cells. A total of 4372 cumulus oocyte complexes (COCs) were recovered by slicing the 1187 caprine ovaries and were matured in maturation media for 27 h in humidified atmosphere at 38.5°C with 5% CO_2 in CO_2 incubator. After 27 h of maturation, oocytes were denuded and were co-incubated with buck semen in fertilization medium (TALP medium+8 mg/ml fatty acid free BSA and 50 µg/ml heparin) for 18 h. Good quality zygotes (2483) were selected and randomly divided into 2 groups (experiment 1), viz. Group 1 (1312) wherein the presumptive zygotes were cultured in RVCL while in Group 2 (1171) the presumptive zygotes were cultured in mCR2aa medium. The cleavage rate, blastocyst and hatched blastocyst production was significantly higher in Gr 1 (47.45±2.93, 10.13±1.31 and 3.90±1.13%) than Gr 2 (37.75±2.46, 4.20±0.93 and 1.66±0.72%). In experiment 2, after *in-vitro* fertilization, morula stage embryos and inner cell mass (ICM) from blastocyst and hatched blastocyst were used to isolate ES cell-like cells. Thus the results indicated that the RVCL medium is the best medium as far as the embryonic development up to blastocyst stage in comparison to mCR2aa media. Furthermore, the formation of putative embryonic stem cell colonies were higher from hatched blastocysts (91.6%) as compared to that of blastocysts (82.1%) and it was significantly higher than that from morulas (34.3%).

frontiers in Immunology

ORIGINAL RESEARCH
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Efficacy of T Regulatory Cells, Th17 Cells and the Associated Markers in Monitoring Tuberculosis Treatment Response

*Sonali Agrawal[1], Om Parkash[1], Alangudi Natarajan Palaniappan[2], Ashok Kumar Bhatia[3], Santosh Kumar[4], Devendra Singh Chauhan[5] and M. Madhan Kumar[1]**

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Treatment monitoring is an essential aspect for tuberculosis (TB) disease management. Sputum smear microscopy is the only available tool for monitoring, but it suffers from demerits. Therefore, we sought to evaluate markers and cellular subsets of T regulatory (Treg) cells and T helper (Th) 17 cells in pulmonary TB patients (PTB) for TB treatment monitoring. Peripheral blood mononuclear cells (PBMCs) were stimulated *in vitro* (with purified protein derivative (PPD)) overnight which was followed by a polychromatic flow cytometry approach to study Treg and Th17 markers and cellular subsets in PTB ($n = 12$) undergoing antituberculous treatment (ATT). The baseline levels of these markers and cellular subsets were evaluated in normal healthy subjects (NHS). We observed a significant decrease in the expression of CD25 ($p<0.01$) marker and percentage of T-cell subsets like $CD4^+CD25^+$ ($p<0.001$) and $CD4^+CD25^+CD39^+$ ($p<0.05$) at the end of intensive phase (IP) as well as in the continuation phase (CP) of ATT. A decrease in CD25 marker expression and percentage of $CD4^+CD25^+$ T cell subset showed a positive correlation to sputum conversion both in high and low sputum positive PTB. In eight PTB with cavitary lesions, only $CD4^+CD25^+$FoxP3 Treg subset manifested a significant decrease at the end of CP. Thus, results of this study show that CD25 marker and $CD4^+CD25^+$ T cells can serve as better markers for monitoring TB treatment efficacy. The Treg subset $CD4^+CD25^+$FoxP3 may be useful for prediction of favorable response in PTB with extensive lung lesions. However, these findings have to be evaluated in a larger patient cohort.

Keywords: tuberculosis, Treg, Th17, treatment, monitoring

INTRODUCTION

Tuberculosis (TB) is an indomitable malady for the mankind since time immemorial. The World Health Organization (WHO) has reported 10.4 million new (incident) cases and 1.7 million TB deaths in 2016 (1). In human immunodeficiency virus (HIV) infected individuals, the figures for incidence of new TB cases were 1.04 million and deaths were 0.4 million. Thus, the morbidity and mortality due to TB are of great concern and thus it needs efficient management. Efficient

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RESEARCH ARTICLE

A Network Biology Approach for Assessing the Role of Pathologic Adipose Tissues in Insulin Resistance Using Meta-analysis of Microarray Datasets

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Abstract: ***Background*:** The role of adipose tissue in Insulin resistance (IR) and Type 2 Diabetes (T2D) has well been received in the biomedical community; being a precursor of T2D, identification of the molecular basis of IR is therefore, vital to elucidate T2D- pathogenesis and meta-analysis of previously conducted microarray studies provides an inexpensive approach to achieve this end.

***Methods*:** In this study, we have carried out a statistical meta-analysis of 157 microarray datasets from five independent studies and identified a meta-signature of 1,511 genes; their functional meaning was elucidated by integrated pathways-analysis. Further, a protein-protein interaction network was constructed and key genes along with their high confidence transcriptional- and epigenetic-mediators were identified using a network biology approach.

***Results*:** Various inflammation- and immune system-related pathways such as TGF-β signaling, IL7 signaling, Neutrophil degranulation, and Chemokine signaling *etc*. were enriched in sick adipose tissues; identified transcription factors, and microRNAs were also found to regulate processes relevant to IR/T2D pathophysiology.

***Conclusion*:** This study endorses the development of effective bioinformatics workflow and further grants an indication for the acceptance of adiposopathy as the root mechanistic pathology that poses risk for development of type 2 diabetes; concept of adipospathy in place of metabolic syndrome will open the possibility to design drugs, those will ameliorate adipose functions and hence proved to be more effective against Type 2 Diabetes.

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Keywords: Cytoscape, Insulin resistance, Microarray, Network biology, Type 2 diabetes, Pathologic adipose tissues.

1. INTRODUCTION

Insulin resistance (IR) has been considered as a precursor of Type 2 Diabetes (T2D). Clinically, it is attributed to defective insulin signaling in its responsive tissues such as adipose, liver, and muscle.

Identification of the molecular basis of IR is, therefore, vital to elucidate the mechanism of T2D pathophysiology. Obesity has long been implicated towards the development of insulin resistance with subsequent clinical manifestations of T2D. However, metabolically healthy obese (MHO) people are clinically characterized in population, delineating the fact that it is indeed *incorrect fat distribution* rather mere *excess fat storage* that sets the stage for IR and T2D etiology; recent findings unraveling the role of adipose tissue in energy homeostasis in addition to its primary function as energy reserve further corroborate this fact [1, 2].

Clinical association of IR with obesity is attributed to inflammation in adipose tissues due to macrophage infiltration, adipocyte hypertrophy, visceral deposition, and the defective process of adipogenesis. These molecular changes deregulate insulin signaling [3]. In addition to it, pathologic adipose tissue also impairs insulin secretion by releasing various non-glucose secretagogues *i.e.* non-esterified fatty acids, glycerol, pro-inflammatory cytokines, leptin, and adiponectin hormones. The distribution of body fat also affects the prevalence of IR. People with peripheral obesity (subcutaneous fat) are less prone to develop IR than people with central obesity (visceral fat) as secretary proteins responsible for energy production seem to predominate in visceral fat. Moreover, adipocytes present in subcutaneous and visceral regions also differ with respect to the amount of protein secretion [2].

DNA microarray is an unbiased method of investigating the genome-wide transcriptome profile in a group of cells or tissue. A number of studies have reported its use in assessing adipose biology in T2D/IR conditions like differences in gene expression across various adipose depots, between lean and obese individuals, the effect of insulin/NEFA/adipokines

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Phytochemical analysis and *in vitro* antimicrobial activities of *Terminalia arjuna* leaf, bark and fruit extracts in different solvents

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Abstract

The soxhlet extracts of fruits, bark, and leaf of *Terminalia arjuna* were obtained using different solvent viz. water, methanol, ethanol, acetone, chloroform and petroleum ether and were analyzed for their phytochemical, antibacterial and antifungal activity. The phytochemical activity of leaf, bark and fruit extract of *T. arjuna* were performed using all six solvent. Results clearly indicate the presence of alkaloids, carbohydrates, cardiac glycosides, proteins, phytosterols, flavonoids, tannins, terpenoids, saponins, and phenols/ polyphenols. Moreover, proteins, flavonoids, tannins, and phenols were present in almost all leaf, bark and fruit extracts of *T. arjuna*. Antibacterial activity of the crude extract was studied against two each of gram-positive and gram-negative bacterial strains along with three fungal strains. All microbial strains (*Bacillus subtilis, Staphylococcus aureus, Escherichia coli, Pseudomonas aeruginosa, Aspergillus niger, Aspergillus flavus* and *Candida albicans*) were procured from IMTech Chandigarh. Antimicrobial activity was performed using the disc diffusion method. The antibiogram of bark extract in methanol, acetone and petroleum ether showed significant ($p < 0.01$) antimicrobial activity. Similarly, significant antimicrobial activity ($p < 0.01$) was observed within the chloroform and aqueous extract of fruits. Maximum antibacterial and antifungal activity was found to be present in the aqueous extract of fruit indicating its probable significance in the reduction of infectious diseases within the feeding livestock population.

Keywords: *Terminalia arjuna,* Bark, Leaves, Fruit, Phytochemical Screening.

Introduction

Study of medicinal plants as natural products is widespread throughout the world [1]. From pre-historical period, medicinal plants have been used for traditional and conventional medicine formulations. People, in general, prefer these medicinal formulations due to their safe, effective and inexpensive mode. Henceforth, medicinal plants are the indispensable part of human healthcare system [2].

Terminalia arjuna tree has a cosmopolitan distribution and is found throughout the Indian subcontinent. It is present in the form of rows within the dry hill areas of several plants near water bodies - rivers, streams, and ravines. It is also planted for ornamental purposes. It thrives best on loose moist, fertile alluvial loams soil and shallow soil, often overlying more or less impervious rock. *T. arjuna* is an evergreen large deciduous tree reaching up to a height of 60-85 feet, bearing yellow flowers and conically shaped leaves [3]. Fruit is fibrous woody, 2.5-3.5 cm long, having five hard wings, striated with numerous curved veins. It has a buttressed trunk and a vast spreading crown from which the branches bent downwards. Flowering occurs between March to

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The role of T regulatory cell-associated markers in monitoring tuberculosis treatment completion and failure

Sonali Agrawal, Om Parkash, Alangudi Natarajan Palaniappan, Ashok K. Bhatia, Santosh Kumar, Devendra S. Chauhan & M. Madhan Kumar

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Abstract

Monitoring tuberculosis (TB) treatment success is crucial for clinical decision-making. The only available tool in this regard is sputum microscopy, but it has demerits. Moreover, in case of smear negatives and extrapulmonary TB, an efficient tool is still sought for. Therefore, we evaluated T regulatory cell (Treg)-associated markers (CD25, CD39, and FoxP3) and cellular subsets in monitoring treatment success in treatment-completed groups. Expression profile of various markers and subsets were compared real time among treatment-naive pulmonary TB

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Effects of Zinc Oxide Nanoparticles on Callus Induction of Banana under Salt Stress Condition

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ABSTRACT

Now a days nano particles are used in every field for the welfare of society. Present study aims to evaluate the effects of ZnO nanoparticle on plant tissue culture of banana under salt stressed condition for the initiation of callus in three variety of Banana.

The response on three different banana variety to callus formation and salinity stress was investigated. A callus was initiated from different parts of banana plant and cultured on MS medium supplemented with 15 and 30 mg/L ZnO nanoparticles along with 0.5, 1, 1.5 and 2% NaCl. The results revealed that the best callus initiation was observed on explants cultured on 15 mg/L ZnO nanoparticles and 1% NaCl, as the NaCl concentration increased the callus initiation moderately reduced (<0.5p) while at 30 mg/L ZnO nanoparticles retard the callus growth significantly (<0.01.p) as the salt concentration increased in MS media. Shoot tips and young leaves were superior in callus production as compared to young stem segments, and significant differences were observed among the different variety in their response to produce callus and subsequent plant regeneration. The results also showed that protein content decreases as the salt concentration increases but callus show increase protein concentration supplemented with ZnO nanoparticles. It was concluded by this study that ZnO nanoparticles help in combating the salt stress and different variety of banana showed significant differences in their response to salt stress, and the variety already grown in saline soil region was superior to the other two variety of that are grown in normal soil.

Key words: ZnO nanoparticles , Salt stress, Callus.

INTRODUCTION:

Application of Metallic nanoparticles (NPs) are now increased day by day in various industries. NPs alter the physico-chemical properties of plants. Among different metals, zinc (Zn) plays important role in biochemical,anatomical and physiological in plants for their metabolism but up to certain level. Among the several macro and micro elements that sre required for plant growth Zn act as the micro nutrients Zinc oxide nanoparticles are widely used in different industrial products that increase their efficacy either it is paints, personal care cosmetics and many drugs like the Zn suspensions that used in infants syrup to prevent dehydration. ZnO-NP are also used as anti UV agents. Beside their potential use, it has increased environmental and health risks due to their interaction with biological and chemical materials (Chithrani et al., 2006). The production of ZnO NPs is up to 528 tons/year and there is increase in production and utilization with time (Zhang and Saebfar, 2010). It was well known fact that Zn is one of the important micronutrient utilized by plant for their proper growth. Zn is an essential nutrient for biosynthesis of natural plant hormone Auxin . Auxin play important role in root formation in all higher plants.

Salt stress one of the abiotic stress that affect and one of the major limiting factor for the productivity of crops. Salt stress induces the osmotic stress, oxidative stress ,disorted protein formation and denaturation of proteins in plants, which lead to cellular adaptive responses and accumulation of compatible organic solutes such as soluble carbohydrates, amino acids, proline, betaines, etc.(Madhava,2006). Salinity may also lead to oxidative stress (Palma et al., 2002) and cause accumulation of reactive oxygen species (ROS) and free radicals ,Plants employ antioxidants compounds (e.g., ascorbate, glutathione, α-tocopherol, and carotenoids) and detoxifying

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Research Article

Detection Limits of Recombinant Secretary Proteins v Protoplasmic Antigens for the Diagnosis of Spontaneo *Mycobacterium avium* subspecies *paratuberculosis* In Ruminants

Kundan Kumar Chaubey[1,2], **Shoor Vir Singh**[1*], **Ashok Kumar Bhatia**[2], **Rinkoo Devi Gupta**[3], **Saurabh Gupta**[1], **Ank Singh**[1], **Zahra Hemati**[5] **and Abhishek Singh Rathore**[3]

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Abstract

Johne's disease is world-wide in distribution and in the absence of control programs bi *avium* subspecies *paratuberculosis* continues to increase in domestic livestock and their m diagnosis of MAP we developed novel recombinant secretary proteins based 'cocktail EL highly immunogenic secretary proteins. C ELISA was compared with extensively validate using semi-purified protoplasmic antigens from novel and native strains of MAP (Indian Bis serum from domestic livestock (726 goats; 150 sheep; 300 cattle; 125 buffaloes) were scre load of MAP. Using I ELISA bio-load of MAP was 55.3, 57.3, 58.0 and 44.0%. In C ELISA it 42.4% in goats, sheep, cattle and buffaloes respectively. Two tests were comparable in however C ELISA had better profiling of samples and highly specific. Bio-load in C ELISA v proteins against all stages of disease. Still using fewer proteins the loss in sensitivity w results of screening of field samples with unknown status and in different stages of disease support the use of C ELISA as future diagnostics for MAP infection in all the domestic livest ELISA will have more consistency in results due to use of expressed and purified six known sPPA used in I ELISA.

Keywords: *Mycobacterium avium* subspecies *paratuberculosis*; Recombinant secretary proteins; sPPA; Cocktail ELISA; Indigenous ELISA; Domesticated ruminants

Introduction

Johne's disease (JD) caused by *Mycobacterium avium* subspecies *paratuberculosis* (MAP) is a notifiable disease and in absence of priority, bio-load of MAP continues to increase in domestic livestock and their milk in India as per our study of past 33 years [1]. MAP has widest host range, hence besides domestic livestock; MAP has been

Population of domestic lives sheep-63.0, cattle-187.0 and bu But there is sharp upsurge in primarily due to JD. Trans colostrum, milk, semen, past reported high bio-load of MA and 40.9% in cattle, buffaloes, 30.8% using multiple tests (mic

Control of JD was un-suc specificity of diagnostic tests i early stages of infection [23].

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Research Article Open Access

Molecular Diversity and Homology in Six CFPs Genes in the Novel Bio-Type, 'Indian Bison Type' of *Mycobacterium avium* subspecies *paratuberculosis* of Goat Origin *vs.* other Biotypes

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Abstract

Objective: Characterization of novel 'Indian Bison Type' bio-type of *Mycobacterium avium* subspecies *paratuberculosis* (MAP) strain 'S5' (goat origin) was done through six MAP cultural filtrate proteins (CFPs) genes (*MAP 1693c, MAP 2168c, MAP Mod D, MAP 85c, MAP Pep AN and MAP Pep AC*) encoding for above six recombinant CFPs.

Material and Methods: Six immunogenic MAP CFPs genes (*1693c, 2168c, ModD, 85c, Pep AN* and *Pep AC*) were cloned and were confirmed by restriction digestions and sequencing. Evolutionary Analysis of the six genes was done using phylogenetic tree constructions and Sequence Identity plot.

Results and Discussion: Sequence analysis of six CFPs genes was studied extensively for their genetic composition, mutations and other variations in their open reading frames. Good percentage of homology has been found among the global biotypes/strains of the MAP along with the MAP strain 'S5' and a novel biotype (Indian Bison Type) of goat origin and other Indian isolates. Aligned sequences of the six genes have been submitted to NCBI. Genebank accessioned by following IDs (MG753462, MG753463, MG753464, MG753465, MG753466 and MG753467). However, certain insertions, deletions within the genes still required to be explored to identify the nature of the disease in Indian scenario with respect to genotypic influences in geographical entity. Mutations were observed in four genes of MAP 'S5' strain, *2168c, Mod D, Pep AN and Pep AC*. Phylogenetic tree analysis of *MAP 'S5'* genes showed *1693c* and *2168c* genes were taxonomically distant, on contrary *Mod D, Pep AN* were located taxonomically closer, 85C was present as out group of the first branch and *Pep AC* slightly away.

Conclusion: The study helped to understand molecular diversity and homology of CFPs genes of MAP 'S5' with other strains. Mutations may lead to modulations in the functions of the MAP metabolism thereby influencing the virulence and host response to the disease.

Keywords: *Mycobacterium avium* subspecies *Paratuberculosis*; Molecular diversity; Homology; CFPs; Indian bison type; Phylogenetic tree analysis; Sequence identity plot

Highlights

Characterization of *Mycobacterium avium* subspecies *paratuberculosis* (MAP) 'S5' Indian Bison Type strain was done through six MAP cultural filtrate proteins (CFPs) genes (*MAP 1693c, MAP 2168c, MAP Mod D, MAP 85c, MAP Pep AN and MAP Pep AC*) which are responsible for encoding six recombinant CFPs.

This study will help to understand the molecular diversity and homology of MAP CFPs genes of MAP 'S5' with other available strains.

Mutations can lead to modulations in the functions of the MAP metabolism thereby influencing the virulence and the host response to the disease.

Introduction

Mycobacterium avium subspecies *paratuberculosis* (MAP) is not only highly pathogenic but also has widest host range infecting domestic livestock species, wild ruminants, other animals, non-human primates and human beings [1-4]. Potential involvement of MAP in human diseases has significant concerns for public health [5]. *MAP bacilli* has been recovered from intestinal biopsies from patients suffering from Crohn's disease, an incurable inflammatory enteritis that affects lower sections of small intestine and colon. Similarly other workers have also reported involvement of MAP in clinical symptoms and gross pathology of Crohn's disease (CD) in human beings and Johne's disease in animals [6-8]. In India, MAP has also been recovered from chronic patients of CD [9], suspected animal workers [10], human population from peri-urban areas [11], mass screening of human samples [1] and of patients suffering with advance clinical stage of CD [12].

Current Topics in Pharmacology
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Original Communication

RNA-seq reveals mode of action of highly diluted preparation of Nux vomica in experimental epilepsy

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ABSTRACT

Epilepsy is one of the most common neurological disorders and there is a pressing need to explore therapeutics based on Complementary and Integrative system of medicines. The present study was designed to validate the protective action of a homeopathic medicine Nux vomica on mice in experimental epilepsy, and also to elucidate its probable mechanism of action. A pharmacological experiment was designed comprising four groups of mice: normal, control, Nux vomica-treated, and diazepam-treated. Subsequent transcriptome-profiling was carried out using RNA-seq to assess molecular-level changes in affected brain-tissues. Pharmacological study demonstrated that Nux vomica significantly ($P < 0.05$) prolonged the survival rate, survival time, and suspended the onset of convulsion. RNA-seq further furnished important insights pertaining to the mechanism of action of homeopathic medicine. Our study provides evidence-based support for the protective action of a potentized homeopathic medicine in experimental epilepsy, and also confers its *modus operandi* at the molecular level. Our study also points toward the fact that homeopathic medicines indeed act at the level of gene expression.

KEYWORDS: anticonvulsants, epilepsy, RNA-seq, homoeopathy, Nux vomica, transcriptomics.

1. INTRODUCTION

Epilepsy is a chronic neurological disorder characterized by recurrent episodes of paroxysmal brain dysfunction and excessive neuronal discharge. At the molecular level, it is attributed to the disturbance in Inhibitory Postsynaptic Potential (IPSP) by inhibitory neurons that use neurotransmitters like Gamma aminobutyric acid (GABA), and glycine. Epileptic agent strychnine has been demonstrated to bind to and block receptors for these neurotransmitters and hence inhibits IPSP resulting in contraction of all skeletal muscles, including the diaphragm for an extended duration; because the diaphragm cannot relax, the victim cannot inhale, and suffocation results [1].

Diazepam is a medication of the benzodiazepine family, with well-documented protective action against strychnine-induced seizures that is attributed to its positive effect on GABA-mediated Inhibitory Postsynaptic Potential [2]. But usage of diazepam has been reported to cause side effects like sleepiness and trouble with coordination [3].

Moreover majority of conventional drugs used in epilepsy management are actually anticonvalescent, providing only symptomatic relief [4]. This situation clearly demands to look toward alternative medicines to identify truly Anti-Epileptic Drugs (AED).

Homeopathic system is a holistic system of therapy. In contrast with the conventional allopathic system that employs drugs which produce symptoms having no relation with the disease symptoms, this method treats the patients by administration of drugs capable of producing symptoms (*medicinal disease*) similar to the disease symptoms (*natural disease*). Cure is supposed to be attained by the

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Involvement of atrial natriuretic peptide in abrogated cardioprotective effect of ischemic preconditioning in ovariectomized rat heart

VK Vishwakarma[1], A Goyal[1], JK Gupta[1], PK Upadhyay[1] and HN Yadav[2]

Abstract

Background: Nitric oxide (NO) is an effective mediator of ischemic preconditioning (IPC)-induced cardioprotection. Atrial natriuretic peptide (ANP) is downregulated after ovariectomy, which results in reduction in the level of NO. The present study deals with the investigation of the role of ANP in abrogated cardioprotective effect of IPC in the ovariectomized rat heart.

Methods: Heart was isolated from ovariectomized rat and mounted on Langendorff's apparatus, subjected to 30 min of ischemia and 120 min of reperfusion. IPC was given by four cycles of 5 min of ischemia and 5 min of reperfusion with Krebs–Henseleit solution. The myocardial infract size was estimated employing triphenyltetrazolium chloride stain, and coronary effluent was analyzed for creatine kinase-MB (CK-MB) and lactate dehydrogenase (LDH) release to consider the degree of myocardial injury. The cardiac release of NO was estimated by measuring the level of nitrite in coronary effluent.

Results: IPC-mediated cardioprotection was significantly attenuated in ovariectomized rat as compared to normal rat, which was restored by perfusion with ANP. However, this observed cardioprotection was significantly attenuated by perfusion with L-NAME, an endothelial nitric oxide synthase inhibitor, and Glibenclamide, a K_{ATP} channel blocker, alone or in combination noted in terms of increase in myocardial infract size, release of CK-MB and LDH, and also decrease in release of NO.

Conclusion: Thus, it is suggested that ANP restores the attenuated cardioprotective effect of IPC in the ovariectomized rat heart which may be due to increase in the availability of NO and consequent increase activation of mitochondrial K_{ATP} channels.

Keywords

Atrial natriuretic peptide, nitric oxide, ischemic preconditioning, ovariectomy, mitochondrial K_{ATP} channels

Introduction

Estrogen deficiency is one of the major risk factors of ischemic heart disease (IHD). It is well documented that men are more susceptible to the risk of IHD than women. But after menopause, the risk of IHD in women reached to the same level as in men of the same age.[1,2] IHDs have been remarked as major cause of morbidity and mortality.[3] Reperfusion of an ischemic myocardium is essential for the restoration of normal functioning of the myocardium.[4] However, abrupt reperfusion of an ischemic heart produces further damage of myocardium, described as ischemia reperfusion injury (I/R injury).[5,6] Ischemic preconditioning (IPC) is a potent endogenous protective happening in response to brief and multiple cycles of myocardial ischemia followed by reperfusion to protect the heart

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RESEARCH ARTICLE

Topical Nanoemulgel for Skin Disorders: Formulation Approach and Characterization

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Abstract: ***Backgrounds:*** *Acne vulgaris* is a common chronic skin disease that affects approximately 650 million people or about 9.4% of the population globally. Growing research in the area of nanotechnology over the years has now been exploited in the management of various human disorders by their application in drug delivery. These approaches have an enormous opportunity for the designing of a novel, low-dose and effective treatment systems to control acne disease. Topical nanoemulsion-based gel preparations are said to have various benefits over the conventional formulations. The recent patents on topical anti-acne formulation (US 7241456B2; US 6897238B2; US 6284234B1) provided the concept to design thymol loaded nano-emulgel for topical application in acne.

Methods: The aim of the present study was to design thymol loaded nano-emulgel preparation by exploiting low-energy emulsification method for topical application in acne. Furthermore, the developed formulation was characterized for thermodynamic stability, mean droplet size, zeta potential, drug content and *in-vitro* drug diffusion study.

Results: The optimized thymol loaded nanoemulsion was found to be 13.60±0.117 nm with PDI 0.197±0.008. Nanoemulsions will provide an enormous surface area for better penetration of the therapeutic agent into the pilosebaceous region, resulting in better efficacy.

Conclusion: From the above studies, it concluded that aqueous-based gel vehicle of the developed formulation system exploited for topical delivery has moisturising properties which can improve local tolerability also.

Keywords: *Acne vulgaris*, nanoemulsion, thymol, pilosebaceous region, topical delivery, moisturising properties.

1. INTRODUCTION

Acne vulgaris is a common chronic skin disorder involving blockage and/or inflammation of pilosebaceous units and mainly affects adolescent [1]. It is characterized by non-inflammatory, open or closed comedones and by inflammatory papules, pustules, and nodules [2]. Acne vulgaris has multifactorial pathogenesis and is usually the result of the interplay of four basic pathogenic events: *increased sebum production, obstruction of pilosebaceous units by abnormal keratinization, inflammation*, and *proliferation of Propionibacterium acnes* [3]. It often leads to negative psychological consequences such as diminished self-esteem, depression and social withdrawal [4].

Topical therapy is available as the use of benzoyl peroxide, antibiotics (erythromycin, clindamycin *etc.*) and retinoids (tretinoin, adapalene,

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Development and evaluation of Chrysin-phospholipid complex loaded solid lipid nanoparticles - storage stability and in vitro anti-cancer activity

Shahadali K, Anuj Garg & Wahajud din

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Original Article

Neuroprotective Activity of *Sesbania grandifolara* Seeds Extract against Celecoxib induced Amnesia in Mice

Bhupesh Chander Semwal[1*], Madhuri Verma[1], Yogesh Murti[1], Harlokesh Narayan Yadav[2]

ABSTRACT

Background: *Sesbania grandiflora* are characterized by their high anti-oxidant properties. The degeneration of neurons in Alzheimer disease mainly occurs because of high production of free radicals. However, the impact of *Sesbania grandiflora* on cholinergic system and oxidative stress parameter has not been investigated. **Aim:** The present study was designed to evaluate the neuroprotective effect of ethanolic extract of *Sesbania grandiflora* seeds in mice. **Materials and Methods:** The seeds of *Sesbania grandiflora* were powdered and subjected to successive extraction in Soxhlet apparatus. The different doses of ethanolic extract of *Sesbania grandiflora* seeds were evaluated for its neuroprotective activity against celecoxib induced amnesia in mice. **Result and Conclusion:** Phytochemical analysis of various extracts of *Sesbania grandiflora* revealed the presence of steroid, saponin, flavonoid, tannins and phenolic compounds. The ethanolic extract of *Sesbania grandiflora* significantly improves the memory of mice and reestablishes the amnesia induced by celecoxib. In addition to improvement in memory the extract treatment also decreases the activity of AchE and MDA and restore the antioxidant anzyme SOD, GSH and catalase in experimental animals. The results of our study showed that ethanolic extract of *Sesbania grandiflora* improve the cognition dysfunction in celecoxib treated mice through the modification in cholinergic system or by the blockage of oxidative stress and inhibition of AchE enzyme.

Key words: Acetylcholine, Celecoxib, Free radical, Morris water maze, *Sesbania grandiflora*.

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INTRODUCTION

Alzheimer's disease (AD) is one of the most common form of dementia in which the neural injury is primarily in the hippocampus and cortex[1] characterized by memory loss, language deterioration, poor judgment, impaired visuospatial skills etc.[2] According to World Health Organization report 44 million of people are suffering from dementia worldwide, estimated that by the year 2050, 135 million of people will have dementia.[3,4] The treatment of mild moderate stage of AD is only symptomatic[5] however these authorized medications have disadvantages including extreme peripheral and central side effects, including git disturbance, insomnia, anxiety and depression.[6] The unwanted side effects caused by authorized medications used to treat AD have constrained researcher to research more secure AChE inhibitors from natural sources. Natural products always have been used as a primary source of medicine from ancient time for the treatment of disease and injury. Still today in many developing country of World, huge number of population using medicinal plants for the treatment of neurodegenerative disorder.[7-9]

Sesbania grandiflora (SG) is a fast growing, small soft wooded tree, belongs to family papilonacea. Every part of SG is utilized for medicine in diuretic, emetic, fevers, headaches, smallpox, anemia, bronchitis, inflammation, leprosy, gout, rheumatism, anxiolytic, anticonvulsive, hepatoprotective and potent antidote for tobacco and smoking-related disease.[10,11] Seeds of SG are possessing intellectual memory enhancer activity.[12]

MATERIALS AND METHODS

Animals

In the present study, all the experiment was carried out using aged male Swiss albino mice weighing between 30-35g were used. The animals were housed under standard conditions of temperature (24±2°C) and relative humidity (30-70%) with a 12:12h light-dark cycle. They were maintained on standard pellet chow diet (Ashirwaad Industries Private Ltd. Roped, India) and water *ad libitum*. The experimental protocol was approved by the Institutional Animal Ethical Committee (GLAIPR/CPCSEA/IAEC/2016/R6) and the care of animals was taken as per the standard guidelines of CPCSEA.

Drug and Chemicals

Piracetam was purchased from UCB India Pvt. Ltd., India DTNB (5, 5 dithiobis 2-nitrobenzoate and ace-

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Original article

Renewable poly(δ-decalactone) based block copolymer micelles as drug delivery vehicle: *in vitro* and *in vivo* evaluation

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ABSTRACT

Polymers from natural resources are attracting much attention in various fields including drug delivery as green alternatives to fossil fuel based polymers. In this quest, novel block copolymers based on renewable poly(δ-decalactone) (PDL) were evaluated for their drug delivery capabilities and compared with a fossil fuel based polymer i.e. methoxy-poly(ethylene glycol)-b-poly(ε-caprolactone) (mPEG-b-PCL). Using curcumin as a hydrophobic drug model, micelles of PDL block copolymers with different orientation i.e. AB (mPEG-b-PDL), ABA (PDL-b-PEG-b-PDL), ABC (mPEG-b-PDL-b-poly(pentadecalactone) and (mPEG-b-PCL) were prepared by nanoprecipitation method. The size, drug loading and curcumin stability studies results indicated that mPEG-b-PDL micelles was comparable to its counterpart mPEG-b-PCL micelles towards improved delivery of curcumin. Therefore, mixed micelles using these two copolymers were also evaluated to see any change in size, loading and drug release. Drug release studies proposed that sustained release can be obtained using poly(pentadecalactone) as crystalline core whereas rapid release can be achieved using amorphous PDL core. Further, mPEG-b-PDL micelles were found to be non-haemolytic, up to the concentration of 40 mg/mL. *In vivo* toxicity studies on rats advised low-toxic behaviour of these micelles up to 400 mg/kg dose, as evident by histopathological and biochemical analysis. In summary, it is anticipated that mPEG-b-PDL block copolymer micelles could serve as a renewable alternative for mPEG-b-PCL copolymers in drug delivery applications.

1. Introduction

In drug delivery applications, amphiphilic block copolymers are ed extensively owing their inherent self-assembly behaviour into diverse nanostructures, such as micelles (Gaucher et al., 2005; Lu and Park, 2013). The term "micelles" defines the aggregation of amphiphilic molecule in core-shell structure, above their critical micelle concentrations (CMC) when dispersed in solvent usually water (Azum et al., 2017b; Kumar and Rub, 2016) (Fig. 1). The CMC is defined as the concentration of amphiphilic molecules in solvent, above which they start forming micelles (Azum et al., 2017a). Amphiphilic block copolymers with poly (ethylene glycol) (PEG) as hydrophilic block such as PEG-b-poly (lactic acid) (PEG-b-PLA), PEG-b-poly(caprolactone) (PEG-b-PCL), PEG-b-poly(aspartic acid) (PEG-b-PA) etc., have been extensively studied as drug delivery carriers. The hydrophobic block in such copolymers can be chosen based on the required application; however, those derived from renewable resources have gained utmost interest, because of their environment friendly nature, abundant availability and in most cases biocompatibility, biodegradability and non-toxicity (Zhang et al., 2017). Additionally, polymers from renewable resources fitting in the concept of "acting responsibly to meet the needs of the present without compromising the ability of future generations to meet their own needs" (Vilela et al., 2014). Therefore, several renewable feedstocks from either plant or animal sources have been discovered, to synthesize polymers with tunable properties.

Micellar formulations have already shown their presence in the market. Genexol PM® (micelles of PEG-b-PLA) have been approved

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Environmental pollutants and aggressive climatic conditions: combination scaffolds of brain stroke

Jeetendra Kumar Gupta, Kamal Shah and Pradeep Mishra*

In the present scenario, health-related complications are worsening because of escalating environmental factors. Pollution of the earth has reached alarming levels. High motorization rate and unchecked industrial wastes produce massive environmental pollutants, which are the most profound factors for aggressive climatic conditions. Heat-trapping pollutants like carbon monoxide and chlorofluorocarbons are increasingly being emitted in the atmosphere. Many toxic pollutants, viz. sulphur dioxide, nitrogen dioxide, mercury and lead have crossed their threshold levels in urban and industrial regions. These pollutants have serious consequences on human health, affecting many organs and systems. They affect our respiratory system, circulatory system and nervous system by entering the blood stream. The blood–brain barrier of the central nervous system is also being disrupted due to sustained exposure. Ischaemia and haemorrhage are the most hazardous incidences of environmental pollutants in brain. It has now become a serious cause of morbidity and mortality. Pollutants like sulphur dioxide and carbon monoxide have a tendency to produce ischaemia and clump through inflammation and arterial blockage. Almost 40% of mortality is caused due to pollution-induced brain stroke. Hence, environmental pollutants are the leading cause of cerebral stroke and somatic disabilities.

Keywords: Brain stroke, environmental pollution, disease mortality, global warming.

THE greatest threat to planet earth is the current audacious ethos of human beings which has many devastating intermediaries leading to a serious ecological damage. Our ecosystem has many biotic and abiotic components influencing each other, and the earth is an open system with regard to energy. An open system gives rise to a number of consequences. It may face the risk of global warming if the energy trapping elements are not controlled in the course of time[1,2]. The most suitable temperature on earth is 16°C, which is providentially the average temperature of earth despite many latitudinal variations. On the basis of the present climatic conditions, it is considered that human beings have entered into anthropocene epoch, where they began to substantially alter the earth's ambience and troposphere by creating an imbalance in the biotic and abiotic components of the ecosystem[3,4]. This severe and intense disturbance in the ecosystem gives rise to aggressive climatic conditions. According to a study on temperature analysis conducted by the National Aeronautics and Space Administration (NASA), USA, the average temperature of the earth has increased and it is tending towards extreme temperatures[5].

Human body follows the process of homeostasis and has the tendency to cope with extreme climatic conditions up to a certain limit. When the temperature of the ecosystem goes beyond 47°C, it results in the coagulation and denaturation of many enzymes *in vivo* as well. Our body physiology is completely dependent on enzymatic processes and almost all enzymes exhibit temperature-dependent kinetics[6]. Hence, in case of extreme climatic conditions, a cascade of disturbances will arise in our vital functions, including alteration in the functioning of the brain. The regulation of body temperature via homeostasis is carried out by the central nervous system (CNS), especially through the hypothalamus[7]. This is located below the thalamus and is the ventral part of diencephalon responsible for many autonomic activities. Various atmospheric pollutants such as sulphur dioxide, carbon monoxide, mercury, lead, etc. have severe deleterious effects on the human brain[8]. Continuous exposure to such pollutants can lead to reduction and impairment in human intelligence and in chronic conditions can also cause brain stroke[9,10].

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Anti-allergy and anti-tussive activity of *Clitoria ternatea* L. in experimental animals

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ABSTRACT

Ethnopharmacological relevance: *Clitoria ternatea* flower is traditionally used in the treatment of respiratory disorders including bronchitis and is one of the ingredients in different Ayurvedic preparations that are used in respiratory disorders. However, till date there is no scientific report on the anti-asthmatic activity of this flower.
Aim of the study: Ethanolic extract of *Clitoria ternatea* flowers (ECT) was evaluated for its anti-allergy and anti-tussive potential in experimental animals. Additionally, the anti-inflammatory potential of ECT was carried out to draw a plausible mechanism of action of the drug.
Materials and Methods: In-vitro anti-asthmatic activity of ECT was evaluated in goat tracheal chain and isolated guinea pig ileum preparations. Acute and chronic anti-asthmatic activity of ECT (100, 200 and 400 mg/kg; p.o.) was estimated in histamine aerosol exposed guinea pigs and in OVA sensitized and challenged mice respectively. Anti-tussive activity of ECT (100, 200 and 400 mg/kg; p.o.) was evaluated against sulfur dioxide- and citric acid-induced cough in experimental animals. Moreover, the anti-inflammatory activity of ECT (100, 200 and 400 mg/kg; p.o.) was evaluated against carrageenan- and acetic acid-induced inflammation in rats.
Results: ECT attenuated histamine-induced contraction in both goat tracheal chain and isolated guinea pig ileum preparations. ECT (400 mg/kg) attenuated histamine-induced dyspnoea and OVA-induced changes in differential cell count in broncheoalveolar fluid, levels of interleukins (IL-1beta and IL-6) and immunoglobulin (OVA-sensitive IgG1) in animals. ECT (400 mg/kg) further ameliorated sulfur dioxide- and citric acid-induced cough in experimental animals. Additionally, ECT (400 mg/kg) attenuated inflammation in carrageenan and acetic acid challenged rodents.
Conclusions: Standardized ECT could be considered as a potential therapeutic alternative in the management of allergy-induced asthma.

1. Introduction

Asthma is considered as a chronic inflammatory disorder of respiratory system that is highly prevalent in world population (Masoli et al., 2004; Bousquet et al., 2005). There are several predisposing factors including allergens play a significant role in the pathogenesis of asthma (Custovic et al., 2010). Epidemiological, clinical and experimental studies suggest that allergenic triggers such as indoor (house dust mites, molds, pets, cockroaches, and rodents) and outdoor (pollens and molds) allergens aggravate the severity of asthma (Bloemen et al., 2007). Thus, allergy gains critical attention in pathophysiology of asthma.

Allergen-induced asthma is characterized by reversible airway obstruction, airway hyperresponsiveness, mucus hypersecretion and airway remodeling (Agrawal and Shao, 2010). Mucus plugging and epithelium denudation is considered as one of the important pathological characteristics in allergen-sensitive asthma (Wenzel et al., 1999; Dweik et al., 2010). Mast cells predominantly localized in mucosal tissue and its activation by allergens produce a plethora of soluble mast cell-derived mediators such as histamine and cytokines including

Abbreviations: ANOVA, Analysis of variance;; BALF, Bronchoalveolar Lavage Fluid; ECT, Ethanolic Extract of *Clitoria ternatea* Flowers; CMC, Carboxy Methyl Cellulose; CF, Charles-Foster; CP, Chlorpheniramine Maleate; CPCSEA, Committee for the Purpose of Control and Supervision of Experiments on Animals;; CT, *Clitoria ternatea*; DEX, Dexamethasone; HPTL, High Performance Thin Layer Chromatography; IND, Indomethacine; IL, Interleukins; Ig, Immunoglobulin; OECD, Organization for Environmental Control Development;; OVA, Ovalbumin; PB, Peribronchial; PV, Perivascular; PBS, Phosphate Buffer Saline; PCT, Preconvulsive Time; UV, Ultra Violet

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The synthetic and therapeutic expedition of isoxazole and its analogs

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Abstract

Isoxazole, constituting an important family of five-membered heterocycles with one oxygen atom and one nitrogen atom at adjacent positions is of immense importance because of its wide spectrum of biological activities and therapeutic potential. It is, therefore, of prime importance that the development of new synthetic strategies and designing of new isoxazole derivatives should be based on the most recent knowledge emerging from the latest research. This review is an endeavor to highlight the progress in the chemistry and biological activity of isoxazole derivatives which could provide a low-height flying bird's eye view of isoxazole derivatives to the medicinal chemists for the development of clinically viable drugs using this information. © 2018, Springer Science+Business Media, LLC, part of Springer Nature.

Author keywords

Anti-inflammatory; Anticancer; Antimicrobial; Biological activity; Heterocyclic; Isoxazole

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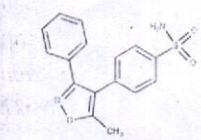
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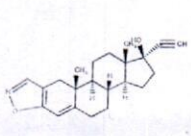
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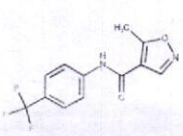
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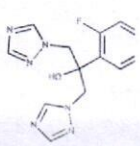
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RESEARCH ARTICLE

Pharmacophore and 3D-QSAR Characterization of Thieno[3,2-*d*] pyrimidine-6-carboxamides as SIRT-2 Inhibitors

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Abstract: ***Background***: Sirtuin 2 is a deacylase enzyme which has a significant role in the treatment of neurodegenerative diseases. A reported series of novel thieno[3,2-*d*]pyrimidine-6-carboxamide derivatives has been chosen as sirtuin inhibitors.

Methods: A pharmacophore and atom-based 3D-QSAR studies were carried out in order to understand the molecular features and structural requirement of these molecules to selectively inhibit the SIRT-2.

Results: The analysis of pharmacophore model revealed two hydrogen bond acceptors, two hydrogen bond donors and one hydrophobic feature as crucial molecular features that predict binding affinity to the SIRT-2 enzyme. The pharmacophore hypothesis (AADDH.7073) derived a 3D-QSAR model with significant Partial Least Square (PLS) statistics values as r^2= 0.9604, SD= 0.2568, F= 137.5, for training set and Q^2= 0.9515, RMSE= 0.2045, Pearson-R= 0.9758, for the test set.

Conclusion: The results provide a detailed structural insights of thieno[3,2-*d*]pyrimidine-6-carboxamide derivatives which can provide guidance to develop novel potent and selective SIRT-2 inhibitors.

Keywords: SIRT2 inhibitor, pharmcophore, 3D-QSAR, molecular modeling, PLS, deacylase enzyme.

1. INTRODUCTION

Silent Information Regulator 2 (Sir2) proteins or sirtuins are a class of NAD^+-dependent histone deacetylases (HDACs) that possess either mono-ADP-ribosyltransferase or deacylase activity [1]. They utilize NAD^+ cofactor to remove acetyl group from the amino acid lysine. They can influence physiological function of cells which affects cellular processes like ageing, transcription, apoptosis or inflammation and are known as key modifiers of neurodegenerative disorders [2]. Interestingly, mammalian sirtuins not only deacetylate histones but also a wide variety of proteins in different subcellular compartments. There are seven known mammalian sirtuins (SIRT1-SIRT7) with distinctive subcellular localizations and enzymatic functions [3]. SIRT1 and SIRT6 are mainly nuclear proteins [4, 5]; SIRT2 is predominantly cytoplasmic [6]; SIRT3, SIRT4 and SIRT5 reside in mitochondria [7] and SIRT7 is localized in nucleolus [8]. SIRT1-SIRT3 plays an important role in cellular metabolism. SIRT4 is responsible for insulin secretion and regulation [9] while SIRT5 regulates urea cycle [10]. SIRT6 and SIRT7 are responsible for DNA repair, metabolism [4] and DNA transcription [8]. Out of these seven sirtuins, SIRT2 is unique as it deacylates proteins such as α-tubulin or p65 [11]. It acts on variety of protein substrates including regulation of transcription, microtubule stability, progression of cell cycle and so on [12]. Its role of deacetylation is marker of neurodegeneration that causes Alzheimer's disease, Parkinson's disease, cancer, diabetes or atherosclerosis [13]. Thus, newer agents which act as selective SIRT2 inhibitor may be used to treat these neurodegenerative diseases. Hence, there is a need of developing novel SIRT2 inhibitors with greater therapeutic value. Quantitative Structure-Activity Relationship (QSAR) methods and Pharmacophore designing assist in the design and development of new potential drug candidates [14-18]. Several QSAR studies have been carried out for modeling activities of several kinds of SIRT inhibitors [19-21]. QSAR and Pharmacophore designing are ligand-based molecular modeling techniques depending on the notion that compounds interacting with the same target could share similar structural or physicochemical properties.

In the present study, SIRT2 inhibitors were selected from the literature [22] and their 3D-QSAR analysis was performed with Pharmacophore Alignment and Scoring Engine (PHASE) to reveal the key structural features required for SIRT2 inhibition. Here, PHASE determines how molecular structure affects drug activity by dividing space into a fine cubic grid, encoding atom type occupation as numerical in-

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Passive delivery of protein drugs through transdermal route

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ABSTRACT

Skin is the largest external organ in the human body but its use for therapeutic purposes has been minimal. Stratum corneum residing on the uppermost layer of the skin provides a tough barrier to transport the drugs across the skin. Very small group of drugs sharing Lipinski properties, i.e. drugs having molecular weight not larger than 500 Da, having high lipophilicity and optimum polarity are fortunate enough to be used on skin therapeutics. But, at a time where modern therapeutics is slowly shifting from use of small molecular drugs towards the use of macromolecular therapeutic agents such as peptides, proteins and nucleotides in origin, skin therapeutics need to be evolved accordingly to cater the delivery of these agents. Physical technologies like iontophoresis, laser ablation, micro-needles and ultrasound, etc. have been introduced to enhance skin permeability. But their success is limited due to their complex working mechanisms and involvement of certain irreversible skin damage in some or other way. This review therefore explores the delivery strategies for transport of mainly peptide and protein drugs that do not involve any injuries (non-invasive) to the skin termed as passive delivery techniques. Chemical enhancers, nanocarriers, certain biological peptides and miscellaneous approaches like prodrugs are also thoroughly reviewed for their applications in protein delivery.

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Stratum corneum; Lipinski rules; macromolecular drugs; protein and peptides; passive delivery; lecithin organogels

Introduction: transdermal route and protein delivery

Transdermal drug delivery renders a beneficial mode of drug administration over oral and parenteral application [1]. They have the tendency to achieve steady-state drug levels, bypass the hepatic first-pass metabolism, increase patient compliance and reduce gastrointestinal (GI) adverse effects [2]. However, it was not until the latter half of the twentieth century that the skin was identified as a route for systemic drug delivery. It was only in 1979 the first transdermal system for systemic delivery was approved in the USA, a three-day transdermal patch for the treatment of motion sickness. A decade later, Nicotine patches have gained enormous popularity as an alternative form of therapeutics in medicine and public in general. At present, there are about 17 drugs delivered via this route and net market share for transdermal therapeutics is currently projected to be worth US $32 billion only, having grown from $20.5 billion in 2010 [3]. But considering the rate of NME (new molecular entities) approvals per year, transdermal drugs lag (0.1 NMEs/year) compared with topical drugs (0.9 NMEs/year) and pharmaceutical innovation in general (20–40 NMEs/year) [2]. Therapeutic agents currently marketed as transdermal drug products share the common physicochemical properties labelled as Lipinski rules, i.e. (a) modest molecular weight (MW 400–500 Da), (b) a balanced lipophilicity [log(octanol–water partition coefficient), log *P*, ideally around 1–3] and (c) an optimum solubility both in oil and in water (considering that TDD necessitates crossing the lipophilic stratum corneum (SC) barrier as well as absorption into the systemic circulation). In addition, drug molecules should be extremely potent in nature [4]. In the past 30 years after the first launch of recombinant human insulin Humulin, biopharmaceutical drugs – such as peptides, enzymes, monoclonal antibodies, recombinant protein drugs and antibody–drug conjugates – have revolutionized the pharmaceutical industry [1]. After that, a sum total of 91 protein based drugs manufactured by recombinant technology have been approved by the FDA [5]. Specificity attributed by the complex structural orientation of proteins and potency has been the cornerstone of protein based therapeutics as compared to small molecule drugs [1,6]. However, stability related matters, complexity of their nature lend the proteins difficult for delivery. The general route of administration for protein pharmaceuticals to date is parenteral (intravenous/subcutaneous). However, because majority of the proteins possess short half-lives, this route poses disadvantage of the necessitated repeated drug administrations and poor patient compliance. Few other routes like the oral, pulmonary and nasal routes have also been explored as alternatives and some products of the same are available in the market. However, limitations like GI degradation, low bioavailability and local irritation persist [7]. In such scenario, skin could be the potential alternative for administration of protein drugs across the skin as it bypasses the first pass metabolism, offers prolonged release of drug and exhibits minimal proteolytic activity compared to other

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Eudragit S100 coated microsponges for Colon targeting of prednisolone

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Abstract

Context: Microsponge is a novel approach for targeting the drug to the colon for the management of colon ailments such as inflammatory bowel disease. Objective: Prednisolone loaded microsponges (PLMs) were prepared and coated with Eudragit S 100 (ES) and evaluated for colon-specific drug delivery. Materials and methods: PLMs were prepared using quasi emulsion solvent diffusion technique using ethyl cellulose, triethylcitrate (1% v/v, plasticizer) and polyvinyl alcohol (Mol. Wt. 72 kDa, emulsifying agent). The developed microsponges were compressed into tablets via direct compression technique using sodium carboxymethyl cellulose (Na CMC) and magnesium stearate as super-disintegrant and lubricant, respectively. The tablets were then coated with ES to provide protection against harsh gastric environment and manifest colon-specific drug release. Results: PLMs were found to be nano-porous spherical microstructures with size around 35 µm and 86% drug encapsulation efficiency. Finally, they were compressed into tablets which were coated with Eudragit S 100 In vitro drug release from ES coated tablets was carried out at various simulated gastrointestinal fluids i.e. 1 hr in SGF (pH 1.2), 2 to 3 h in SIF (pH 4.6), 4–5 h in SIF (pH 6.8), and 6–24 h in SCF (pH 7.4) and the results showed the biphasic release pattern indicating prolonged release for about 24 h. Discussion and conclusion:In vitro drug release studies revealed that drug starts releasing after 5 h by the time PLMs may enter into the proximal colon. Hence maximum amount of drug could be released in the colon that may result in reduction in dose and dose frequency as well as side effects of drug as observed with the conventional dosage form of prednisolone. © 2017 Informa UK Limited, trading as Taylor & Francis Group.

REVIEW ARTICLE

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BENTHAM SCIENCE

Stimuli-responsive Smart Liposomes in Cancer Targeting

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Abstract: ***Background*:** Liposomes are vesicular carriers which possess aqueous core entrapped within the lipid bilayer. These are carriers of choice because of biocompatible and biodegradable features in addition to flexibility of surface modifications at surface and lipid compositions of lipid bilayers.

***Objective*:** Liposomes have been reported well for cancer treatment using both passive and active targeting approaches however tumor microenvironment is still the biggest hurdle for safe and effective delivery of anticancer agents. To overcome this problem, stimuli-responsive smart liposomes have emerged as promising cargoes pioneered to anomalous tumor milieu in response to pH, temperature, and enzymes *etc.* as internal triggers, and magnetic field, ultrasound, and redox potential as external guides for enhancement of drug delivery to tumors.

***Conclusion*:** This review focuses on all such stimuli-responsive approaches using fabrication potentiality of liposomes in combination to various ligands, linkers, and PEGylation *etc.* Scientists engaged in cancer targeting approaches can get benefited greatly with this knowledgeable assemblage of advances in liposomal nanovectors.

Keywords: Stimuli-sensitive, liposomes, thermo-sensitive, pH-sensitive, ultrasound responsive, smart delivery.

1. INTRODUCTION

Nanocarriers like liposomes, polymeric and inorganic nanoparticles, and drug/nucleic acid conjugates are found to be extraordinarily safe and effective as compared to "naked" drugs/nucleic acids [1-5]. Bioengineering of these carriers with suitable ligands improves *in vivo* performance by many folds in terms of blood retention, target selectivity, cellular internalization, and environmental responsiveness to external or internal stimuli such as pH, redox potential, enzyme, magnetic field, ultrasound, light and temperature [6-10]. The anomaly in tumor microenvironment offers the possibilities to fabricate nanocarriers for effective temporal and spatial localization of drug/bioactive by controlling release, internalization, and intracellular fate [11, 12]. Liposomes are regarded as the model biomembranes in the field of drug delivery with enhanced safety and efficacy. These have been explored for the site-specific drug delivery by extra- or intracellular targeting using various functionalization techniques [13, 14]. These are well documented cargoes for theranostic potential as they show better pharmacokinetics and efficacy for treatment of cancers. Since cancer possesses complex physiology of the microenvironment it demands multifaceted approach to design liposomal cargoes such as, remote-controlled or tumor stimuli-responsive characteristics to enhance tumor extravasation, selective ligands to facilitate cellular internalization, and biocompatible guides for intracellular localization within tumor cells [15, 16]. However, the therapeutic potential of liposomes is limited because of insufficient approachability to tumor site, non-selective uptake and non-effective release of drug within the tumor. Recently, nanocarriers based theranostics including polymer conjugates, vesicular and nanoparticulate systems, and carbon nanotubes are attracting scientists for desired co-delivery of diagnostic and therapeutic agents. These theranostic nanocarriers can bring both therapeutic and diagnostic potential at macro level as well as molecular level. Tethering bioligands and incorporating stimuli-responsive elements have emerged with great potential to control release at targeted site of interest [17]. Application potential of cell-penetrating peptide such as elastin-like polypeptide based therapeutics is also under exploration for the thermo-responsive and targeted delivery of therapeutic bioactives for the treatment of cancer. As these approaches can accomplish both passive and active targeting using liposomes for better intra-tumoral localization [18]. Dendritic cells (DC) are involved in antigen presentation and generation of cytotoxic T lymphocyte (CTL) response which are required for vaccination against cancer. Various ligands like mannose, CD11c/CD18, Fc receptor, DEC-205 and DC-SIGN on DC are reported for active targeting of cancer using pH sensitive liposomes [19]. Recently, liposome-nanoparticle assemblies (LNAs) are introduced to combine the potential of liposomes with engineered nanoparticles for better therapeutic outcomes. In particular, LNAs can protect the stimuli-sensitive nanoparticles from immune system and to initiate and control drug release upon triggering in response to external stimuli so called nanoparticle-controlled liposomal release. LNAs are not widely explored and researches are trying to build the structure-function relationships of LNAs [20]. Paliwal *et al.* (2014)

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Ultrasound-based triggered drug delivery to tumors

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Abstract

Over the past few decades, applications of ultrasound (US) in drug delivery have been documented widely for local and site-specific release of bioactives in a controlled manner, after acceptable use in mild physical therapy for tendinitis and bursitis, and for high-energy applications in fibroid ablation, cataract removal, bone fracture healing, etc. US is a non-invasive, efficient, targetable and controllable technique. Drug delivery can be enhanced by applying directed US in terms of targeting and intracellular uptake. US cannot only provide local hyperthermia but can also enhance local extravasations and permeability of the cell membrane for delivery of cell-impermeable and poorly permeable drugs. It is also found to increase the anticancer efficacy of drug against solid tumors by facilitating uniform drug delivery throughout the tumor mass. This review summarizes the mechanism of US; various drug delivery systems like microbubbles, liposomes, and micelles; and biological manifestations employed for improving treatment of cancer, i.e., hyperthermia and enhanced extravasation. Safety issues are also discussed for better therapeutic outcomes of US-assisted drug delivery to tumors. This review can be a beneficial asset to the scientists looking at non-invasive techniques (externally guided) for improving the anticancer potential of drug delivery systems. © 2017, Controlled Release Society.

Author keywords

Cancer; Liposomes; Micelles; Microbubbles; Solid tumor; Ultrasound

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REVIEW ARTICLE

BENTHAM SCIENCE

Advances in Tumor Targeted Liposomes

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Abstract: Cancer remains a deadly disease for effective treatment. Although anomalous tumor microenvironment is now widely exploited for targeted chemotherapy, safe and efficacious drug delivery to tumor cells is not still warranted. Liposomes are promising biodegradable and biocompatible nanocarriers having potential amenability for surface and internal modifications, and extraordinary capability to carry both hydrophilic as well as hydrophobic drugs. Meticulous fabrication of liposomes with tumor selective ligand(s) and PEGylation reduces immunogenicity and increase target-specificity. This review focuses on critical developmental aspects of liposomes to target cancer cells exploiting Enhanced Permeability and Retention (EPR) effect and tumor-selective ligands such as folate, transferrin, peptides etc. Moreover, stimuli-responsive smart liposomes (triggers: pH, temperature, enzymes, magnetic field, ultrasound, and redox potential etc.) are also investigated for enhancement of drug delivery to tumors. This review summarizes advances in tumor-targeted liposomes via various means of targeting. This knowledgeable assemblage of advances in liposomal approaches will render new insights to formulators and budding scientists to design cancer targeted liposomes.

Keywords: Cancer, chemotherapy, active targeting, ligand, anticancer agents, EPR effect, PEGylation.

1. INTRODUCTION

Nanocarrier based drug delivery using liposomes, polymeric and inorganic nanoparticles, and drug/nucleic acid conjugates have been found to be comparatively more safe and effective than "naked" drug/nucleic acid [1-5]. Modification of these carriers improves *in vivo* performance by multi-folds in terms of blood retention, target selectivity, cellular internalization, and environmental responsiveness to external or internal stimuli such as pH, redox potential, enzyme, magnetic field, ultrasound (US), light and temperature [6-11]. Liposomes are regarded as the model biomembranes with promising safety and efficacy for site-specific drug delivery [12]. Since cancer possesses complex physiology of the microenvironment it demands multifaceted approach to design tumor targeted liposomes (TTLs) such as, remote-controlled or tumor stimuli-responsive characteristics to facilitate tumor extravasation, selective ligands for effective intracellular localization within tumor cells [13, 14]. Tumor can be targeted by exploiting two well-known approaches namely passive and active targeting [15]. In active targeting, the ligands such as small molecular weight molecules *i.e.* folate and peptides, or proteins *i.e.* monoclonal antibodies (mAb), or their fragments are coupled to liposomes via amide, disulfide, and thioether linkages [16, 17]. Cell-penetrating peptides (CPP) improve antitumor efficacy by enhacing the penetration of TTLs in tumors. Moreover, CPP like TAT-peptide can circumvent the issue of endo-lysosomal degradation of the liposomal content upon cellular internalization by conferring a direct plasma translocation [18]. This review encompasses advances *vis-a-vis* challenges pertaining to TTLs for better liposomal interventions.

2. NEED TO DEVELOP TTLS AND FABRICATION ASPECTS

The drugs encapsulated in the liposomes are protected from enzymatic degradation, binding to plasma proteins but it is needed to stabilize the liposomes for targeted applications particularly in the systemic circulation so as to ensure drug release at the target. PEGylation and use of the highly saturated phospholipid and cholesterol containing lipid compositions can improve pharmacokinetics and stabilize liposomes for safe and effective drug delivery to the tumor. This approach so called passive targeting allows more accumulation of the drug selectively to solid tumours owing to enhanced permeability and retention (EPR) effect [19]. However, the released drug from liposomes in the vicinity of tumor tissues may not be internalized by the tumor cell. The targeting ligand

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Peroxisome Proliferated Activated Receptors (PPARs): Opportunities and Challenges for Ocular Therapy

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ABSTRACT: Peroxisome proliferator-activated receptors (PPARs) are nuclear transcription factors. They exist in three isoforms (PPAR-α, PPAR-β/δ, and PPAR-ϒ) in humans, but mainly PPAR-ϒ, and they are expressed in retinal epithelial pigment. PPARs are involved in mediating numerous pathological implications in eye such as diabetic retinopathy (DR), choroidal neovascularization (CNV), glaucoma, diabetic macular edema, and other retinal diseases. Peroxisome proliferator-activated receptors are key players in various biological pathways like lipid degeneration, immune regulation, and reactive oxygen species regulation, regulation of vascular endothelial growth factor, matrixmetalloproteinase-9, and docosahexaenoic acid pathway. Based on evidence from clinical investigations, the drugs meant for PPARs could be promising candidates for intraocular therapy. Anti-VEGF therapy, including bevacizumab, ranibizumab, and aptamers (pegaptanib), has been approved for wet age-related macular degeneration (ARMD). Recently, researchers have explored the role of PPAR-γ in ocular pathophysiological processes and PPAR-γ agonists as novel adjuvants in the treatment of eye diseases. PPAR-γ exhibits potential benefits to improve or prevent various vision-threatening eye diseases such as age-related macular degeneration (ARMD), diabetic retinopathy (DR), keratitis, and optic neuropathy. However, PPAR-γ presents challenges and offers opportunities for ocular scientists to bring better outcomes.

KEY WORDS: Peroxisome proliferator-activated receptors (PPARs), diabetic retinopathy (DR), choroidal neovascularization (CNV), age-related macular degeneration (ARMD)

ABBREVIATIONS: PPARs, peroxisome proliferator-activated receptors; **DR**, diabetic Retinopathy; **CNV**, choroidal neovascularization; **ARMD**, age-related macular degeneration; **CME**, cystoid macular edema; **TCA**, tricarboxylic acid; **AGE**, advanced glycation end product; **PKC**, protein kinase C; **ROS**, reactive oxygen stress; **PARP**, poly-ADP ribose protein; **MCP**, monocyte chemoattractant protein-1; **PG**, prostaglandins; **NF-κB**, nuclear factor-kB; **VEGF**, vascular endothelial growth factor; **MMPs**, matrix metalloproteases; **iNOS**, nitric oxide synthase; **COX-2**, cyclooxygenase-2; **ICAM**, 1- intracellular adhesion molecule; **VCAM1**, vascular cell adhesion protein 1, **IL-1b**, Interleukin 1b; **NO**, Nitric oxide; **ET-1**, Endothelian 1; **MCP**, monocyte chemo-attractant protein; **RPE**, retinal pigment endothelium; **CDK**, cyclin dependent kinase; **DAG**, diacylglycerol, **NUC1**, nuclear hormone receptor

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Role of polymers in 3D printing technology for drug delivery-an overview

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Abstract

Background: 3D printing (3DP) is an emerging technique for fabrication of a variety of structures and complex geometries using 3D model data. In 1986, Charles Hull introduced stereolithography technique that took advances to beget new methods of 3D printing such as powder bed fusion, fused deposition modeling (FDM), inkjet printing, and contour crafting (CC). Being advantageous in terms of less waste, freedom of design and automation, 3DP has been evolved to minimize incurred cost for bulk production of customized products at the industrial outset. Due to these reasons, 3DP technology has acquired a significant position in pharmaceutical industries. Numerous polymers have been explored for manufacturing of 3DP based drug delivery systems for patient-customized medication with miniaturized dosage forms. Method: Published research articles on 3D printed based drug delivery have been thoroughly studied and the polymers used in those studies are summarized in this article. Results: We have discussed the polymers utilized to fabricate 3DP systems including their processing considerations, and challenges in fabrication of high throughput 3DP based drug delivery systems. Conclusion: Despite several advantages of 3DP in drug delivery, there are still a few issues that need to be addressed such as lower mechanical properties and anisotropic behavior, which are obstacles to scale up the technology. Polymers as a building material certainly plays crucial role in the final property of the dosage form. It is an effort to bring an assemblage of critical aspects for scientists

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Nanocarrier Based Advances in Drug Delivery to Tumor: An Overview

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Abstract

Background: Nanotechnology deals with the manufacturing of materials at the atomic and molecular scale. According to the National Nanotechnology Initiative, nanotechnology denotes those structures which are nearly in 1-100 nm size regime in at least one dimension.

Objective: Nanotechnology in drug delivery has been evidenced into nanocarriers that possess distinct properties both in vitro and in vivo, which may be used in targeting drugs to various diseases especially tumors. In the last few years, there has been a keen concern in the formulation of various new drug delivery systems employing nanotechnology. Different nanodevices or nanocarriers like liposomes, dendrimers, polymersomes, transfersomes, and nanoparticles etc. have been employed for the targeted drug delivery.

Conclusion: This review summarizes the advances in nanocarriers in terms of their methods of preparation and potential applications especially in tumors.

Keywords: Nanotechnology; dug delivery; nanocarriers; targeting; tumors..

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1971–2017: Evolution, exploration and test of time of conjoint analysis

Kushagra Kulshreshtha[1] · **Vikas Tripathi**[1] · **Naval Bajpai**[2]

Abstract The purpose of this study is to have epistemological and systematic in-depth review about 'conjoint analysis', a multivariate data analysis technique. Moreover, an attempt is made to provide the past and current status of research done along with its contribution, relevance and future research agenda in the field of research. To study manifold aspects about conjoint analysis, systematic literature review (SLR) and meta-synthesis techniques were used in combination for qualitative assessment that ensured a rigorous review. In total, 119 peer-reviewed articles were included in the review. The current study depicted the development and expansion of conjoint analysis in marketing research and beyond it in other associate fields. Through the combined application of systematic literature review (SLR) and meta-synthesis, the various commercial and industrial applications of this technique were explored. Moreover, the process of implementation of conjoint analysis with the help of an example and limitations of previous and current studies were discussed. Based on our robust search through relevant papers of reputed databases and best of our knowledge, this is the first literature review paper in the last decade providing the background, evolution, application, limitation and future research avenues of 'conjoint analysis' technique, which no other study has done so far.

Keywords Conjoint analysis · Literature review · Systematic literature review · Consumer preference

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Chapter 1
B-School Selection by Fuzzy TOPSIS and AHP

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ABSTRACT

Rapid liberalization of education sector in India has resulted in increased competition. As a result, we have witnessed rapid rise in number of management institutes. The student's evaluation about an institute/college is based on multiple criteria. Realizing the need a focused review on the literature was made to understand the subject. The review highlighted that conventional methods for B-school evaluation are inadequate for dealing with the imprecise, uncertain or vague nature of linguistic assessment. To overcome this difficulty, due to MCDM problem, Fuzzy multi-criteria decision-making methods are proposed. The aim of this study is to use fuzzy technique for order preference by similarity to ideal solution (TOPSIS) and Analytical Hierarchal process (AHP) methods for the selection of better B-school. The proposed methods have been applied to a B-School selection problem of the students of NCR and results are presented. This chapter contributes to previous researches by adding a new avenue, where the MCDM technique can be useful. The selection of an institution for getting a professional degree is a very tough task for the students and as well as for their guardians. This method can help them to find a better solution by providing a quantitative framework.

INTRODUCTION

In this competitive environment parents are very much concerned about B school selection after the completion of graduation of their wards. This study is intense on the best business school selection in NCR region in India. Liberalization and development of NCR region become the primary factors for the rapid growth of institutions (government and private) providing business education. This rapid growth

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E-consumer conformity and its impact on consumer attitude

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Abstract

Purpose – *With the tremendous increase in the number of netizens, online consumer behavior has become an important issue nowadays. One of the important issues of online consumer behavior is e-consumer conformity. This paper aims to explore prominent factors of e-consumer conformity and its impact on consumer attitude, which helps marketers to understand this new business arena and involve this relationship to enhance their business.*

Design/methodology/approach – *For the purpose, convenience sampling was used with sample size of 510. Offline as well as online mode of survey was applied. The resultant hypotheses (based on the developed model depicting normative and informational consumer conformity effect on attitude) were examined by structured equation modeling.*

Findings – *The present study presents the different dimensions of e-consumer conformity and its difference in metro and non-metro cities on which marketers have to frame their strategies. The study revealed that the customer attitude is largely affected by others expectations (conformance with others expectations, NCC) rather others knowledge and expertise (ICC). Additionally, the comparison of virtual conformity behavior of metro and non-metro customers was made, and it was found that conformity behavior does not significantly differ in these two contexts.*

Practical implications – *Business saturation in metro cities, infrastructural growth and technological advancement in non-metro cities, companies are moving toward non-metro cities. Due to contextual differences existing between metro and non-metro market, it is difficult to trace the changes in the marketing policies and device the appropriate strategy accordingly for the marketers. In lieu of this, the present study presents the different dimensions of e-consumer conformity and its degree of difference in metro and non-metro cities on which marketers have to frame their strategies.*

Originality/value – *Good number of research has been conducted on consumer conformity in India; however, there is a scarcity of literature in virtual consumer conformity in India. This research is not only establishing the relationship between virtual consumer conformity and consumer attitude but also establishing the difference of virtual consumer conformity in metro and non-metro cities in India.*

Keywords *Consumer involvement, Consumer attitude, Consumer conformity*

Paper type *Research paper*

Utkal Khandelwal is Associate Professor, Seemant Kumar Yadav is Assistant Professor, Vikas Tripathi is Professor and Vivek Agrawal is Associate Professor, all at GLA University, Mathura, India.

1. Introduction

The past decade has witnessed a new form of social networking. Facebook, Twitter, Blogs and WhatsApp have established the new form of social structures. These virtual communications have also changed the modern consumer market structure. Internet users increase with the rapid speed day by day so as the users of social network with 1,968 million users of Facebook, 1,200 million of WhatsApp, 600 million of Instagram and 319 of Twitter by April 2017 and expected to reach 3.02 billion by 2021 (www.statista.com). The world's largest democracy and fastest developing economy, India, which is the research context, are also witnessing such change in its social structure with respect to the internet usage. The total internet users were 432 million in December 2016 (with urban has 269 million and 163 million in rural India), which rises to reach between 450-465 million by June 2017 says a report titled "Internet in India 2016", jointly published by the internet and Mobile

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Exploring key dimensions of e-service quality: a case of Indian banking industry

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Abstract: Customers become more aware of a company's performance when the service provider adopts technology. In such situations, customers demand more reliable services and greater security in financial transactions. Thus, banks need to improve the quality of e-services provided by them. The present paper seeks to identify e-service quality dimensions relevant to the banking industry. It attempts to critically analyse the relationship amongst them so that policy makers can focus on relevant parameters to improve the e-service quality in banking. Interpretive structural modelling (ISM) approach has been applied in this study for modelling the e-service quality dimension. The major findings of this study are to prioritise the strategic dimension in reducing the risks associated with e-service quality. The hierarchical presentation of dimensions and their classification into driver and dependent categories is a unique attempt that has been made in context of e-service quality in the Indian banking industry.

Keywords: bank; e-service quality; interpretive structural modelling; ISM; MICMAC analysis.

Reference to this paper should be made as follows: Agrawal, V., Tripathi, V. and Agrawal, A.M. (2018) 'Exploring key dimensions of e-service quality: a case of Indian banking industry', *Int. J. Services and Operations Management*, Vol. 29, No. 2, pp.252–272.

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Inclusive workplace and organizational citizenship behavior

Study of a higher education institution, India

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Abstract

Purpose – The purpose of this paper is to examine the relationship between employees' perception of an inclusive workplace, namely, inclusive practices, inclusive climate and inclusive leadership and organizational citizenship behavior (OCB). It also attempts to examine the difference in perception toward the inclusive workplace along the three major dimensions of diversity, namely, gender, category they belong to and their religious orientation.

Design/methodology/approach – Non-probability sampling technique is employed to collect primary data through a self-administered questionnaire from 492 academicians of a higher education institution situated in western Uttar Pradesh of India. The data set was analyzed using statistical tools like descriptive statistics (*z*-test and ANOVA), and multiple regression analysis.

Findings – Results of the multiple regression analysis reflected direct and significant relationship between inclusive workplace and OCB. It has been observed that organizations with a conducive climate of inclusion, a well formulated inclusive practices and strong leaders' commitment will result into high level of OCB which is apparent among employees working in a higher education institution western Uttar Pradesh. The results of *z*-test reflected that male and female employees have similar perception toward inclusive climate. However, there is a significant difference in perception toward inclusive practices and inclusive leadership on OCB. On the other hand, results of ANOVA reflected that with respect to religious orientation there is no significant difference among perceptions toward inclusive workplace. However in case of category employees have similar perception toward inclusive climate in contrast with inclusive practices and inclusive leadership.

Research limitations/implications – The present study established the concept of inclusive workplace, entirely on the basis of individual viewpoint. While to examine the cause and effect relationship of an inclusive workplace on OCB, it is recommended to incorporate some moderating or intervening variables.

Practical implications – This study provides guidelines for academic institutions to understand and foster an inclusive workplace that will encourage the academicians to exhibit OCB.

Originality/value – Very little research had examined the relationship between inclusive workplace and OCB. This research will add value to the existing literature on inclusive workplace and its probable impact on organizations and individuals by examining this relationship with respect to gender, category and religious orientation of employees working in higher educational institution of India.

Keywords Organizational citizenship behaviour, Higher education institution, Workforce diversity, Inclusive workplace

Paper type Research paper

Introduction

With the advent of globalization, there is a landscape change in emerging markets, technological advancement, cultural-revolution and multi-generational composition of workforce around the world. Amid of these revolutionary changes business leaders around the world are striving hard for sustainable growth by means of developing a more

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Motivational and success factors: through the lens of women entrepreneurship

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Abstract: With the development of society, women entrepreneurs turn out to be more prominent. Their significant contributions in the economy make them recognised at the national and international level. The initiation, growth and success of women owned enterprises are determined by the push and pull factors of motivation. This study emphasised the role of motivational factors in the entrepreneurial success of women in the Indian context. A structured questionnaire was used to collect data through personal administration of the questionnaire among women entrepreneurs of different regions in Uttar Pradesh, the biggest state of India. The collected data was analysed using exploratory factor analysis (EFA) and the factors related to motivation and successes of the entrepreneurship was explored and according to that, five hypotheses were framed. The findings focused on the constructive relationship between motivational and success factors with the help of regression coefficients. The invigorating of women enterprises is necessary for maintaining the gender justice and equality around the world.

Keywords: exploratory factor analysis; EFA; motivation; multiple regression approach; success; women entrepreneurs; India.

Reference to this paper should be made as follows: Agarwal, S., Agrawal, V. and Agrawal, A.M. (2018) 'Motivational and success factors: through the lens of women entrepreneurship', *Int. J. Management and Enterprise Development*, Vol. 17, No. 4, pp.307–328.

Biographical notes: Sucheta Agarwal is working as an Assistant Professor in the Institute of Business Management, GLA University Mathura, India and is currently pursuing her PhD from the Department of Management Studies, Indian Institute of Technology, Roorkee, India. Her areas of interest are human resource management, entrepreneurship, industrial relations and organisational behaviour.

Unconscious bias: thinking without thinking

Himani Oberai and Ila Mehrotra Anand

Himani Oberai and Ila Mehrotra Anand are Assistant Professors, both at the Institute of Business Management, GLA University, Mathura, India.

Introduction

An individual makes countless decisions in a day without even being aware of them. The solutions to various problems can be influenced by unconscious biases. It refers to a situation which we are unaware of and which happens beyond our control. Interestingly, it happens involuntarily and is triggered by our instinct. These instincts are influenced by our background, societal environment, and personal experiences. These biases are a bundle of feelings and thoughts about others that play a very important role in influencing our judgment toward them. According to Noon (2018), unconscious or implicit biases are learned stereotypes that are natural, automatic, unintentional, and so deeply engrained that they can easily influence one's behavior. In other words, we can say that unconscious bias is a shortcut based on our attitudes and stereotypes that have developed over a period of time (Guynn, 2015). They are reflexively triggered without our knowledge.

Unconscious biases are a fact of life; no one can deny them. They influence everything, from clothes to car. These biases commonly manifest at workplace. The unconscious biases can hurt or affect workplace diversity and employee policies, thereby undermining organizational culture and ethics. Biases can be based on many things – skin color, marital status, gender, parental status, age, height, physical and biological factors, etc. They can influence our decisions in favor of one or other group. A study by Duke University revealed that "mature-faced" people had a career advantage over "baby-faced" people. A Pew Research Center survey (2015) revealed in a study that organizations tend to change their standards for women who want to climb corporate ladder or who want entry in the C-suite. Hence, women face more and greater problems if they occupy higher positions in the organization. In 2013, Google revealed that only 3 of its 36 executives are female, and they owned this unfair ratio because of the unconscious biases prevailing in the company (Manjoo, 2014).

How unconscious bias is formed?

The universal tendency of unconscious bias exists among human beings. They are often rooted in a human's brain, which is continuously bombarded with information and influences from one's background, values, traditions, beliefs, societies, cultural environment, etc. Our brain has the tendency to group this information in various categories and tag them with general descriptions. Bias occurs when our brain tags these categories with labels of "good" or "bad" and then applies these generalizations indiscriminately. It can be assumed that unconscious bias can also be caused by conditional learning. An individual's unconscious biases are greatly influenced by their social experiences. Researchers have claimed that repeated exposure to stereotypical associations and prejudices forms the basis for unconscious biases.

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Vibe manager: the most millennial job title ever

Ila Mehrotra Anand and Himani Oberai

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If you want your people to have a better time at work, then the job of the vibe manager is to set a positive culture

Vibe at workplace

Companies these days are giving due importance to the look and feel of the workplace. The way the office is designed has been found to have a great impact on productivity, wellness, and engagement levels of employees. Most organizations today, have a well-designed office space, thereby helping to create an environment conducive to the overall productivity of the employees.

Businesses have become increasingly concerned about creating "good vibes" in the workplace. This would lead to an increase in productivity. For this purpose, they are looking for managers who can create those vibes within the office.

Vibe managers

Companies are looking for people who are well connected, who think out of the box, and have their finger on the pulse of the fast-changing lifestyle and industry trends. Throwing parties, designing the office, and organizing outings and lavish dinners are all part of the job description of a vibe manager. They need to find the best of the venues, menus, and places to connect potential clients to employees. They are expected to keep themselves up to date with the latest changes in the lifestyle and industry and adopt the same.

Such trendy arrangements help in ensuring that employees enjoy themselves at work, which in turn can do wonders for their satisfaction levels. Millennials today are looking for employees who are cool and can match up their lifestyle.

Case of Bateman Company

It was for the first time in the year 2014, Bateman Company in San Francisco put up a recruitment announcement for "Talent and Vibe Manager". The person's responsibility would be to help recruit "rock star candidates" and also come up with some trendy ideas for office activities. "You need to be plugged in enough to find us the right venues, connected to the right people at the right hotels and basically able to leverage the very best of what Brooklyn and San Francisco have to offer," CEO and founder of Bateman Group, Fred Bateman, stated in one of his interactions with the media.

"Adding vibe to their responsibilities gives them something more meaningful and gives their job more respect. It's not just answering phones or planning parties, they have to be thoughtful about it," he added.

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Work disengagement among SME workers: evidence from India

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Abstract

Purpose – The purpose of this paper is to examine the two alternative theoretical explanations of disengagement at work. Following the job demands-resources (JD-R) perspective, the relationship between job complexity and disengagement is tested. In accordance with the process model of burnout, the association between exhaustion and disengagement is examined. The paper also examines conservation of resources (COR) as an integrative framework as far as the moderating role of resilience in both these relationships is concerned.
Design/methodology/approach – Survey-based quantitative methodology was followed. A total of 138 employees of an agro-processing unit in North India were surveyed, and 119 usable responses were obtained. Besides the constructs of interest, the questionnaire also sought responses on the relevant demographic variables.
Findings – Both job complexity and exhaustion predicted disengagement at work. However, contrary to a negatively hypothesized relationship between job complexity and disengagement, a positive association was found. Resilience was found to be negatively moderating exhaustion-disengagement relationship. No influence of resilience was found on the complexity-disengagement association.
Research limitations/implications – The findings could be specific to the sample and to India. Caution should be exercised while generalizing. Future researchers should validate the findings across contexts.
Practical implications – The results suggest that complexity may not necessarily be perceived as a resource. Hence organizations must invest in training and skill development programs for their workers. Further, managers should assess resilience as an important component while selecting workers.
Originality/value – Contrary findings *vis-à-vis* job complexity and disengagement could have implications for the JD-R perspective. Further, this research integrates alternative explanations of disengagement employing the COR framework.

Keywords Resilience, Disengagement, Exhaustion, JD-R, Conservation of resources, Job complexity
Paper type Research paper

Introduction

Small and medium enterprises (SMEs) are increasingly being considered as the backbone of modern economies (Ajayi *et al.*, 2017). Not only do they stimulate economic growth, but are also likely to absorb shocks during economic downturns (Psychogios *et al.*, 2016). Particularly in the developing and emerging economy contexts, SMEs are known to generate employment and contribute significantly to a nation's gross domestic product and export earnings (Javalgi and Todd, 2011; Saini and Budhwar, 2008).

Despite the promise as well as a need for SME proliferation, it is a sad reality that the research literature in entrepreneurship and innovation in emerging markets is very scant. Particularly in the Indian context, there is hardly any entrepreneurship literature (Javalgi and Todd, 2011). In fact, the field of systematic HRM research in Indian SMEs is "almost barren" (Saini and Budhwar, 2008, p. 418). As a fallout, business leaders and managers in SMEs across the developing world are often groping in dark for solutions to their most pressing problems.

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Student engagement in Indian context: UWES-S validation and relationship with burnout and life satisfaction

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Abstract: The student version of Utrecht work engagement scale (UWES-S) is increasingly being employed to assess student engagement without sufficient evidence for its validity, reliability and generalisability. This research seeks to investigate the psychometric properties of UWES-S in the Indian context. Two studies are reported. Study 1 (N = 207) investigates the 14-item UWES-S for factorial and convergent validity, and internal consistency. Study 2 (N = 279) revalidates findings from study 1 and examines relationships with burnout and life satisfaction. The three-factor morphology of UWES-S stands validated across both the studies. Evidence for convergent validity and internal consistency has been provided. The research also proposes a nine-item version of UWES-S based on psychometric properties and item analysis. Further, student engagement is found to be negatively associated with student burnout

Determinants of Mutual Funds Investment Intentions: Big Five Personality Dimension

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Abstract

Purpose:
Over the past several decades the behaviours of investors have been the focal point of many researchers to understand the psychological antecedents for investment decision. This paper attempts to examine the impact of specific personality traits on investment intentions to purchase mutual funds with specific focus on the Big Five personality taxonomy.

Design/Methodology/Approach:
To scrutinize the specific personality predictors, this study employs the multiple regression using theory of planned behaviour (TPB).

Findings:
The research indicated that individuals who are extraverted intend to engage in mutual fund investment, while those who are higher in neuroticism less intended to engage in this activity. In addition to this, Individuals who are higher on agreeableness are also intended to engage in mutual fund investment.

Managerial Implications:
The study will aid mutual fund providers to manage the portfolio of mutual fund according to investors' personality traits.

Scope for further research / Limitation:
Due to time constraints, the study is confined to Delhi-NCR only. The study can considered as a pilot study and could be further explored to more cities in India.

Keywords: *Mutual Funds, Big Five Personality, Theory of Planned Behaviour, Investment Intention*

Effect of economic growth initiatives on regional economies: a study in the Indian context

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Abstract: In the present context when India is preparing to witness huge economic expansion though numbers of development programs and initiatives, it becomes important to evaluate them on the basis of their usefulness, structure and evenness in development by analysing different studies in the same field, an attempt has been made to find suitable approaches required for economic development. Increase in regional disparity in the phase of economical development makes the central issue of the paper and the study have been done to find viable methods to minimise it.

Keywords: economic development; entrepreneurial development; 'Make in India'; Indian economic development initiatives; India.

Reference to this paper should be made as follows: Tripathi, V., Singh, A.P. and Roy, R. (2018) 'Effect of economic growth initiatives on regional economies: a study in the Indian context', *Int. J. Entrepreneurship and Innovation Management*, Vol. 22, No. 3, pp.286–297.

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आलेख

विद्यालयी शिक्षा में नवाचार

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Key words: कण्ठस्थ, नकारात्मक, उत्पादक एवं निमार्ण आदि।

शिक्षा में नवीन विचारों एवं प्रयोगों के आधार पर जो अमूलचूल परिवर्तन उत्पन्न होता है और शिक्षा का परिमार्जन विद्यार्थी के व्यवहारिक व तर्कज्ञान को बढ़ाने के साथ साथ विषय व प्रकरण की सार्थकता में वृद्धि करता है। वह नवाचार कहलाता है। शिक्षा व्यक्ति को परिमार्जित करने का महान कार्य करती है। भारत में यह कार्य अनन्त काल से होता रहा है आज कल की शिक्षा में हमारे युवाजनों की बढ़ती अरूचि से पता चलता है कि उनके मन की स्थिति क्या है। इसी दृष्टि से शिक्षा के प्रत्येक क्षेत्र में अब नया प्रयोग करने के लिए शिक्षा शास्त्रियों को ध्यान आकृष्ट हो रहा है।

नवाचार क्यों आवश्यक है इसके क्या क्या कारण है इसके लिए हमें अपनी वैदिक शिक्षा प्रणाली की ओर नज़र डालनी होगी। सर्वप्रथम वैदिक काल में शिक्षकों/ऋषि/मुनियों/की कक्षाओं की बात करना समीचीन होगा जिनकी एक कक्षा में दस-दस हजार शिष्य एक साथ शिक्षा लेते थे। महर्षि भारद्वाज की कक्षा में एक साथ हजारों शिष्य अध्ययन किया करते थे। वैदिक शिक्षा काल का विद्यार्थी वृहद पाठय वस्तु को कुछ ही समय में कण्ठस्थ कर लिया करते थे।

आधुनिक काल तक आते आते स्थिति ये है कि अब विद्यार्थी कक्षा में बैठकर पढ़ने से कतराता है। ऐसी स्थिति हम शिक्षकों के व्यवहार को ही उत्तरदायी ठहराती है। शिक्षा शास्त्रियों ने छात्र छात्राओं का ध्यान आकर्षित करने के लिए शिक्षा में कुछ नई चीजे जोड़ दी है जिन्हें नवाचार का नाम दिया गया है। जिसके द्वारा आज के विद्यार्थी को एक दिशा प्रदान की जाती है

नवाचार विधि या पद्धति होने के साथ साथ मानव जीवन की आवश्यकता है हमारे चाहे नचाहे यह होता ही है परिवर्तन प्रकृति का नियम है परिवर्तन नवीनता लिए होता है योजित रूप से करने पर यह सकारात्मक, उत्पादक एवं निमार्ण का द्योतक होता है अन्यथा नकारात्मक, अनउत्पादक एवं विरोध के रूप में परिलक्षित होता है।

शिक्षा मानव विकास को दिशा देती है भविश्य की चुनौतीयों के लिए तैयार करती है विषय किसी क्षेत्र विशेष में निपुणता या प्रभुत्व प्रदान करता है वर्तमान में विषयों का विस्तार वृहद रूप से हुआ है। जिसकों परम्परागत विधि प्रविधियों के माध्यम से सार्थक रूप से अधिगमित नही कराया जा सकता है या परिस्थियों के अनुरूप शिक्षा प्रदान करने के माध्यमों व

Technologically Mediated Communication Improves English Language Learning Rapidly.

Shiva Durga, et al.

Abstract

My paper deals with the improvement of the proficiency of English learners to a desirable and a very easy level to have effective practice outside the classroom with the learner-centered perspective while broadening the pedagogical knowledge. Internet has created international mobility as globalization which is more helpful for learners of English to acquire communication skills and knowledge through many sources. It helps anyone to think in English the relevant matter to express in a logical sequence to promote self learning skills. There are ample chances for everyone to learn English through many ways like audio visual technology, internet through websites, extensive reading, peer group association, language games, translation method and socially mediated communication. This paper deals with the opportunities to learn English particularly through social media and other sources. We are really fortunate to live in the age where we have ample options. Personal status improves the business rapidly. Students learn these outside the classroom without the help of their teachers. So society plays a great role in the field of communication. As English is globalized there are ample opportunities for the teachers also to learn outside the classrooms. The visual effects from videos give active, faster and clear information when compared to the textual content.

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A Perspective of the Challenges Facing (Primary School) Teacher in India

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Conceptual Framework:-

S.K. Nigam (1935) cited as having stated that "of all the educational problems that beset Asian countries today, none is as persistent or as compelling as the one relating to the training of a competent teacher".

This comment, made in L967, still remains true about teacher training in Asia generally and in India in particular today. Indeed, teachers have an indispensable role to play in our education system. If we are to have quality education we need sufficient teachers who are well trained and motivated professionals' professionalism is one of the most important characteristics that should identify teachers..... particularly primary school teachers who are the subject of discussion in this paper This paper will attempt to give a perspective of the challenges facing basic school teacher training, recruitment and quality in India The paper will pay particular attention to how primary colleges recruit students' the nature of training offered, the deployment of the students, and the effects of the challenges on the quality of education in India'

2. Background-

The government is the main provider of education and training, even though privately owned schools, run by churches and, especially,