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Unique identification code for medical fundus images using blood vessel pattern for tele-ophthalmology applications

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Abstract

Background and objective Identification of fundus images during transmission and storage in database for tele-ophthalmology applications is an important issue in modern era. The proposed work presents a novel accurate method for generation of unique identification code for identification of fundus images for tele-ophthalmology applications and storage in databases. Unlike existing methods of steganography and watermarking, this method does not tamper the medical image as nothing is embedded in this approach and there is no loss of medical information. Methods Strategic combination of unique blood vessel pattern and patient ID is considered for generation of unique identification code for the digital fundus images. Segmented blood vessel pattern near the optic disc is strategically combined with patient ID for generation of a unique identification code for the image. Results The proposed method of medical image identification is tested on the publically available DRIVE and MESSIDOR database of fundus image and results are encouraging. Conclusions Experimental results

indicate the uniqueness of identification code and lossless recovery of patient identity from unique

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Apple disease classification using color, texture and shape features from images

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Abstract

The presence of diseases in several kinds of fruits is the major factor of production and the economic degradation of the agricultural industry worldwide. An approach for the apple disease classification using color-, texture- and shape-based features is investigated and experimentally verified in this paper. The primary steps of the introduced image processing-based method are as follows: (1) infected fruit part detection is done with the help of K-means clustering method, (2) color-, texture- and shape-based features are computed over the segmented image and combined to form the single descriptor, and (3) multi-class support vector machine is used to classify the apples into one of the infected or healthy categories. Apple fruit is taken as the test case in this study with three categories of diseases, namely blotch, rot and scab as well as healthy apples. The experimentation points out that the introduced method is better as compared to the individual features. It also points out that shape feature is not better suited for this purpose. © 2015, Springer-Verlag London.

Author keywords

Color; Feature fusion; K-Means clustering; LBP; Shape; SVM; Texture

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High capacity secret image sharing using multilayer image steganography with primary cover predictive error

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Abstract

Image steganography is the art of hiding secret message in greyscale or cover images. Easy detection of secret message for any state-of-art image steganography can break the stego system. To prevent the breakdown of the stego system two tier data hiding is used. In this paper, we propose a high capacity image steganography with greyscale primary cover. Predictive primary cover (PPC) is computed from the primary cover using median edge detector (MED) predictor. Predictive error (PE) is the difference between primary cover and the PPC. The high level bit planes of the secret image (payload) are X-ORed with low level bit planes of the PPC and vice-verse. The resulting Stego image is embedded in a secondary cover image using bit plane X-OR algorithm. The cover image used is an RGB colour image. The proposed steganography scheme enhances the level of security of the existing bit plane X-OR algorithm without considerably increasing the computation time and detectability. The experimental results show that the proposed scheme achieves higher level of security with high embedding capacity. Higher level of security achieved by the proposed multilayer steganography scheme enhances the performance and security of the bit plane X-OR algorithm. Copyright © 2016 Inderscience Enterprises Ltd.

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Integrated approach of software project size estimation

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Abstract

In the past, some researchers have shown that using more than one technique can reduce the risk of trusting only one method. At present many estimators use function point input in estimations based on COCOMO. This research paper includes the use and explanations related to advantages of these two "public domain" costing methods and the proposal of an integrated single model for size estimation. The problem of language dependency is well addressed and the language-weighted function point is introduced as the solution domain. Research paper demonstrates that the use of backfiring conversion factors is inherently inaccurate as there is no effective relationship between SLOC and FP. The use of homogeneous data can provide the acceptable results as established. It is demonstrated and established that the combination of physical size and functional size using the LOC and function points can affect the productivity. Using weighted function points as the main input in a COCOMO-like power function enables the effect of the programming language which enables the model to be easily adapted to other development environments. Such estimates are of very high degree of accuracy. © 2016 SERSC.

Author keywords

COCOMO; Function point; Language-weighted function point; Productivity

Modified LexRank for Tweet Summarization

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Abstract

Summary generation is an important process in those conditions where the user needs to obtain the key features of the document without having to go through the whole document itself. The summarization process is of basically two types: 1) Single document Summarization and, 2) Multiple Document Summarization. But here the microblogging environment is taken into account which have a restriction on the number of characters contained within a post. Therefore, single document summarizers are not applicable to this condition. There are many features along which the summarization of the microblog post can be done for example, post's topic, it's posting time, happening of the event, etc. This paper proposes a method that includes the temporal features of the microblog posts to develop an extractive summary of the event from each and every post, which will further increase the quality of the summary created as it includes all the key features in the summary.

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Speech Recognition Using Soft Computing- A Review

Author Sandeep Rathor Dr. R. S. Jadon

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Abstract

Abstract:

This paper is to presents a laconic survey on Speech Recognition along with the discussion of the major technological advances made in the past years of research and also gives overview of techniques developed in each stage of speech recognition. After many years of research and development, one of the most important challenge remains is the accuracy of automatic speech recognition. It includes variability of speaker, language and environment, vocabulary size, noise etc. The existing problems in ASR and the various techniques to solve these problems given by various researchers have been presented in this paper. The primary objective of this review paper is to summarize and compare some of the popular methods used in various stages of speech recognition using soft computing i.e. Neural Network, Fuzzy logic and Genetic Algorithm.

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A survey on manual and non-manual sign language recognition for isolated and continuous sign

Subhash Chand Agrawal , Anand Singh Jalal , Rajesh Kumar Tripathi

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Abstract

Sign language recognition is an important area of human computer interaction (HCI). The last decade witnessed a good number of publications in this field. Furthermore, several surveys can be found in the literature but none of them addresses an overall review in this field. In this paper, we have specifically highlighted the Indian sign language (ISL). The works under the complex and moving background, integration of non-manual signals, large vocabulary and signer independent have got a very little attention in the past. In this paper, we have discussed hand segmentation and tracking, feature extraction and classification methods exist in the literature. Within these methods, we examine the various issues such as signer dependence/independence, manual/non-manual, glove/device-based, vocabulary size, constraints in hand segmentation, and isolated/continuous sign. The purpose of this paper is to provide a complete progress in the field of SLR, specifically in ISL.

Keywords: hand segmentation, feature extraction, classification, hand gestures, hand tracking, isolated signs, continuous signs, dataset, evaluation measures, manual signals, non-manual signals, sign language recognition, human-computer interaction, HCI, Indian sign language, vocabulary size

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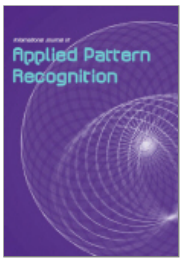

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PERFORMANCE ANALYSIS OF CHAOS BASED INTERLEAVER IN IDMA SYSTEM

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Abstract

Chaos are wide spread in nature, furthermore its use in the field of communication drew attention in early 90's and recently chaos based spread spectrum (SS) communication become an interesting area of research. Based on the research; this paper presents the study of chaos theory and then leads the discussion towards the chaos based SS system. Interleave Division Multiple Access (IDMA) based spread spectrum has been considered for performance analysis. First it reviewed the role of chaos in spread spectrum communication and then discussion extends to chaos based IDMA, which is relatively a new and promising technique in this area. Simulation results verify that chaos based IDMA can achieve good BER performance as well as offers less computational complexity.

Keywords:

Chaos, Spread Spectrum System, CBDSS, Bifurcation, IDMA

1. INTRODUCTION

In IDMA scheme, interleavers are used to distinguish the different users. This scheme is the improved version of classical CDMA scheme. IDMA inherits all the advantages of CDMA scheme especially it overcomes the major limiting factor of CDMA such as: multiple access interference (MAI) and Inter Symbol Interference (ISI). Interleavers are used to spread the information and to protect these bits from error bursts due to multipath propagation and noise sources. Hence, efficient interleaver can increase the throughput of iterative MUD receivers [1].

Interleavers should be easy to generate and not to consume large bandwidth and memory. Interleavers should also be non-colloidal in nature [2]. Many Interleavers were studied and proposed in the literature. Rumsey (1970) presented the study of basic interleaver design. Randomly Interleaved sequence can be the good choice of interleaver but the memory requirement in Random Interleaver (RI) is very high and this limitation motivates for further research. Pupeza et al. (2006) suggested the study of Nested Interleaver (NI).The limitation of this interleaver was the extra memory requirement [2]. Kusume et al. (2008) proposed the designing of Shifting Interleaver (SI). The bit error rate performance of this interleaver was good but not suitable for multi user detection (MUD) system [3]. M. Shukla et al. (2009) presented the designing of Tree based Interleaver (TBI). This interleaver was also having the scope of improvement in memory requirement [5].

On the other hand Chaotic signals are deterministic, limited and non-periodic as well as highly sensitive to the initial condition [4]. Chaotic signals are noise like and wide-band and hence may be good candidate for interleaving sequence. Furthermore, the cross correlation property is also encouraging. Chaos-based systems are having significant advantages over traditional spread spectrum systems in terms of security and synchronization [5]. Chaos is in itself a very universal and robust phenomenon in many nonlinear systems with certain characteristics. According to chaotic dynamics these characteristics are (a) highly sensitive to initial conditions (b) wideband frequency spectrum (c) noise like behavior (d) high complexity [6]. These properties made chaos useful in communication engineering specifically for security of information.

This paper meets the following objectives; firstly it provides introduction to chaos theory and its role in spread spectrum communication engineering and secondly the chaos based interleaver employed in IDMA based communication system for performance enhancement. It will also explore the new area of developments on the basis of signal processing capability.

The content of the paper is organized as follows. In section 2, the introduction of chaos theory is discussed. Section 3, defines the IDMA system and algorithms for interleaver generation. Section 4, develops the performance analysis of chaos based IDMA schemes and finally section 5 conclude the paper.

2. CHAOS THEORY

This could be noted that sinusoidal carriers may be a better choice in communication systems. When a sinusoidal signal is used to transmit information, the power spectral density concentrates in a narrow range of frequencies. Whereas chaotic signals, can occupy a large bandwidth, their autocorrelations and cross correlation properties are also favorable. These characteristics made chaotic signals a better choice in communication systems. Chaos-based SS systems have several properties, namely (i) Difficult to interfere with any unauthorized user; (ii) information transfer is more secure than any other communication system (iii) resistant to jamming. Chaos can be better understood with the help of difference equations. The logistic population model is very popular to understand chaos.

Definition 1: The logistic map is given as:

$$f(x_n) = x_{n+1} = rx_n(1-x_n) \quad (1)$$

where, r is growth rate of population and an important parameter to discuss. Here parameter r is elaborated for different value ranges.

For the range $0 \le r \le 4$.

Proposition: For the above range logistic map sends [0, 1] to itself.

Proposition: For the value of $r < 1$, fixed and stable point is 0. For the value $r > 1$ it is unstable. One more point is stable i.e. $x = 1 - (1/r)$, but only for $0 < r < 3$ and unstable for $r > 3$.

Proof: If we solve the equation $rx(1-x) = x$, the fixed point yields $x_1 = 0$ and $x_2 = 1 - (1/r)$ and from the derivative of equation i.e. $f'(x) = r(1- 2x)$ we get $f'(0) = r$. Hence 0 is stable point for the specified range. Similarly second point is also stable for above said range.

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Statistical feature extraction based iris recognition system

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Abstract. Iris recognition systems have been proposed by numerous researchers using different feature extraction techniques for accurate and reliable biometric authentication. In this paper, a statistical feature extraction technique based on correlation between adjacent pixels has been proposed and implemented. Hamming distance based metric has been used for matching. Performance of the proposed iris recognition system (IRS) has been measured by recording false acceptance rate (FAR) and false rejection rate (FRR) at different thresholds in the distance metric. System performance has been evaluated by computing statistical features along two directions, namely, radial direction of circular iris region and angular direction extending from pupil to sclera. Experiments have also been conducted to study the effect of number of statistical parameters on FAR and FRR. Results obtained from the experiments based on different set of statistical features of iris images show that there is a significant improvement in equal error rate (EER) when number of statistical parameters for feature extraction is increased from three to six. Further, it has also been found that increasing radial/angular resolution, with normalization in place, improves EER for proposed iris recognition system.

Keywords. Biometric; circular Hough transform; hamming distance, iris recognition system; statistical features.

1. Introduction

Automated security of information and authentication of persons have invariably been an interesting subject of research. Biometric systems for authentication are based on features obtained from one's face [1], finger [2], voice [3] and/or iris [4, 5]. Iris recognition system is widely used in high security areas. A number of researchers have proposed various algorithms for feature extraction. A little work [6, 7] however, has been reported using statistical techniques directly on pixel values in order to extract features. In the subsequent subsections, three phases of IRS, preprocessing, feature extraction and matching are discussed in brief.

1.1 *Image preprocessing*

Preprocessing refers to convert the image of eye into a form from which the desired features can be extracted and used for identification of an individual. Image preprocessing is divided into three steps – iris localization, iris normalization and image enhancement. Iris localization means to detect the inner and outer boundaries of iris, to find and remove the eyelashes of eyelids that might have covered the iris region. Iris normalization is performed to convert the iris image from Cartesian coordinates to polar coordinates. Normalized iris image is a rectangular image with angular and radial resolutions. Normalization helps in removing the dimensional inconsistencies that arise due to variation in illumination, camera distance, angle, etc. while capturing the image of an eye. Now, the obtained normalized image is enhanced to compensate for the low contrast, poor light source and position of light source. A number of algorithms for pre-processing have been proposed and implemented by different researchers [4, 8–11].

1.2 *Feature extraction*

Feature extraction is the next important step after preprocessing. The normalized image is used to extract significant features from iris image by applying suitable transformations. These features are further encoded to make the comparisons between templates more effective. Different techniques like wavelet transform [12], Hilbert transform [13] and Gabor filters [4, 14, 15] are employed on the

*For correspondence

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Structural and electronic property calculations of $In_xGa_{1-x}As$ alloy based on all electron potentials from first-principle theory

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First-principle calculation has been performed to study the structural and electronic properties of binary GaAs and InAs semiconductors and their alloy $In_xGa_{1-x}As$ using projector augmented wave (PAW) and PAW+U techniques, based on all electron (AE) potentials. The effect of composition x of indium (In) on equilibrium lattice constant (a_0), bulk modulus (B_0) and pressure derivative of bulk modulus (B_0') have been investigated using local density approximation (LDA), PAW and PAW+U techniques. The values of bandgap (E_g) of GaAs, InAs and $In_xGa_{1-x}As$ have been calculated from these methods. The structural and electronic parameters a_0, B_0 and E_g have been found to be nonlinear with alloy composition x. The calculated values are compared with the experimental values and the values reported by different researchers. A fairly good agreement has been obtained between them.

Keywords: GaAs , InAs semiconductors, $In_xGa_{1-x}As$ alloy, DFT, EOS, Local density approximation, Projector augmented wave, First-principle calculation

1 Introduction

III-V group semiconductors have attracted considerable attention due to their potential applications in optoelectronics devices, high density data storage capacity, high power conversion efficiency with their wide bandgap[1-4]. The formation of self-assembled quantum dots (SAQDs) by the Stranski-Krastanov growth mode and superlattices have been demonstrated successfully in different material systems such as (Ga)InAs/(Al)GaAs or InP/GaInP hetero-structures[5,6]. In the present work, first principle calculation has been carried out to determine structural and electronic properties of zincblende (Zb) GaAs and InAs semiconductors and their alloy $In_xGa_{1-x}As$ at equilibrium (T=0, P=0) of cubic structure with space group[7,8] F4-3m within the local density approximation (LDA) and projector augmented wave (PAW) approximation techniques. Hubbard U values have been calculated for Ga, In and As using linear response approach. The effective interaction parameters in the PAW+U method have been performed for calculating the structural and electronic properties such as equilibrium lattice constant, bulk modulus, band structure and fundamental bandgap of above study binary semiconductors and their alloy.

2 Theoretical Description

2.1 Ground State Energy and Structural Properties Calculations

For the calculation of structural and electronic properties of $In_xGa_{1-x}As$ alloy, the structural and electronic properties of cubic Zb GaAs and InAs semiconductors have been investigated. A plane wave basis set has been selected for Zb GaAs with 85 Ry energy cut-off and 340 Ry charge density, and for Zb InAs, 70 Ry energy cut-off and 280 Ry charge density in the calculation. The plane wave basis set with energy cut-off 55 Ry and charge density 440 Ry has been selected for both Zb GaAs and InAs semiconductors in PAW method. The crystal reciprocal lattice and integration over the Brillouin zone have been performed using 8×8×8 Monkhorst-Pack[9] mesh with no origin shift for the LDA and PAW techniques. The non-conversing pseudo-potential[10] has been employed for ion-electron interaction with the LDA approximation in the Perdew-Zunger (PZ) exchange-correlation functional within DFT theory[11,12]. The electronic configurations have been taken as Ga($4s^24p^1$), In($5s^25p^1$) and As($4s^24p^3$) considering 3d electrons in core region for the calculation of the ground state energy in LDA

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Neural Network Based Sliding Mode Control for Uncertain Discrete-Time Nonlinear Systems with Time-Varying Delay

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Abstract

The present paper discusses the stability analysis of discrete-time uncertain nonlinear systems with time-varying delay, uncertainties related to parametric uncertainty and unknown nonlinearity. The time-varying delay considered has minimum and maximum bounds. The novelty of Chebyshev Neural Network (CNN) is that it requires much less computation time as compared to multi layer neural network (MLNN) and radial basis function network (RBFN). It is preferred to approximate the unknown nonlinearities. Furthermore, results for robust stabilization of discrete-time uncertain nonlinear systems with time-varying delay are given on the basis of linear matrix inequalities (LMI). The sufficient condition is derived for the asymptotic stability of the defined systems. The proposed controller guarantees the system state trajectory to the designed sliding surface in the presence of uncertainties and time-varying delay. Simulation results illustrate the validity of the proposed approach.

Key-words: Chebyshev Neural Network; Sliding Mode Control; Linear Matrix Inequalities; Lyapunov-Krasovskii Function; Time-varying Delay

1. INTRODUCTION

Time-varying delay often appears in various systems, such as robotic systems, motion control systems, mechanical engineering systems and so on. The time-varying delay in such systems degardes the system performance and are often source of instability. However, in motion control systems the inaccurate modelling and errors caused due to external conditions uncertainties and nonlinearities, deteriorate system performance. Over the past few years, the stability analysis of time-varying delayed systems with uncertainties have been studied and documented in [1]-[6]. The stability analysis of

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A COMPARATIVE STUDY OF DIFFERENT TYPES OF MIXER TOPOLOGIES

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Abstract

In this paper, a comparative study of different types of mixer topologies is presented. Gilbert cell is widely used as core of the mixer because it provides high conversion gain, good port-to-port isolation and low even-order distortion. It is found that the linearity of mixer is very good for Multi-Tanh technique by incorporating multiple differential trans-conductance stage but it reaches to very low conversion gain whereas, use of current bleeding technique increase linearity and conversion gain of the mixer by adding current source to increase the bias current at the expense of power consumption. A very low value of noise figure can be achieved with the switched biasing technique by replacing current source with parallel connected nMOS transistors but due to use of the transistor in place of tail current source, linearity is degraded and more power is consumed. Folded Cascode Technique is used to reduce DC supply voltage by folding the LO switching stage with pMOS transistors in switching stage but it degrades the noise figure. Bulk-driven technique can be employed to lower down the power consumption by providing the switching action via the gate of LO (RF) and amplification by the bulk of LO (RF) transistors, however it reduces the linearity. High linearity is obtained by using CCPD (Cross coupled post distortion) technique by cancelling of third order derivatives but it decreases the conversion gain and consume more power due to increase in the number of auxiliary transistors. MGTR enables to achieve high linearity by incorporating auxiliary transistor but it decreases the overall conversion gain and increases noise figure of the mixer. So it is observed that there is a trade-off among the performance metrics, i.e., conversion gain, noise figure linearity, and power consumption of the mixer.

Keywords:

Multi-Tanh, Current Bleeding Technique, Switched Biasing, Folded Cascode, Bulk-Driven, CCPD, MGTR

1. INTRODUCTION

RF mixer is an indispensable part of modern wireless communication system. Mixer is a three port active or passive device, designed to provide down-converted and up-converted version of input frequency. When the desired frequency at the output is lower than the input frequency it is called as down-conversion and if the signal at the output is at higher frequency than the input signal, it is known as up-conversion as shown in Fig.1.

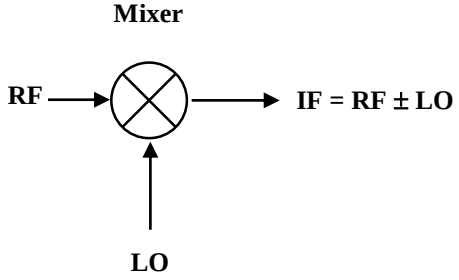

Fig.1. Mixer

On the basis of performance and structure, mixer can be single balanced mixer or double balanced mixer [14]. An active mixer provide conversion gain and requires low LO power but it has poor linearity, whereas, passive mixer provides high linearity and increased dynamic range but requires high LO drive [23]. Single balanced mixer requires differential form of local oscillator (LO) signal and single ended form of RF signal as shown in Fig.2 [12].

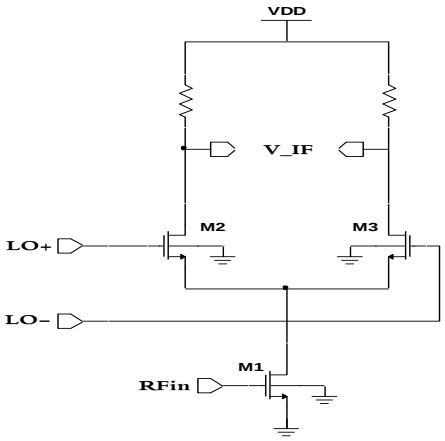

Fig.2. Single balanced mixer [12]

Double balanced mixer operates with differential LO as well as differential RF signal as shown in Fig.3. [20]. Single balanced mixer is simple in design and provide moderate gain and low noise figure but has poor port to port isolation between LO to RF and LO to IF and possesses low third order input intercept point (IIP_3). Double balanced mixer provide high port to port isolation and has output spurious product rejection capability [7].

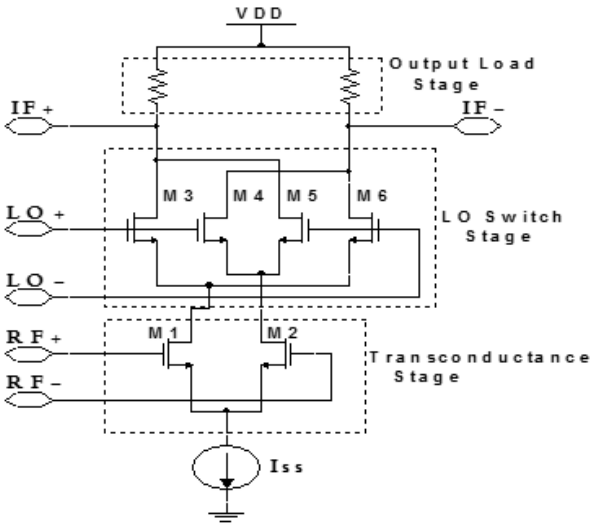

Fig.3. Schematic of conventional double balanced CMOS Gilbert cell mixer [12]

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DESIGN AND IMPLEMENTATION OF LOW-NOISE AMPLIFIER FOR ULTRA-WIDEBAND RECEIVER IN 180nm CMOS TECHNOLOGY

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Abstract

This paper presents an ultra-wideband (UWB) low noise amplifier (LNA) using two stage cascading topology to obtain high gain. Inductive degeneration and peaking inductor techniques are used to obtain wideband matching and flatness of gain. The proposed UWB LNA is implemented by using 180nm based CMOS TSMC technology using Advanced Design System (ADS) software.LNA achieves maximum gain of 15.5dB, minimum noise figure of 2.88dB, -6dBm of IIP3 and wideband input matching in the UWB frequency range of 3.1GHz to 10.6GHz. The proposed LNA provides group delay of 60ps and isolation of less than 25dB under the 1.8V DC power supply.

Keywords:
CMOS, UWB, Gain, Noise Figure, Isolation

1. INTRODUCTION

In the year 2002, the UWB radio technology (3.1GHz to 10.6GHz) was approved by Federal Communication Commission (FCC) in USA, for short range wireless applications.

Low noise amplifiers are significant block in UWB receivers which receive weak signal from the UWB frequency and amplify this signal with low noise figure and high gain. LNA in wireless receiver is responsible for high and flat gain, low power consumption, low noise figure, good input impedance matching and linearity. LNA can be broadly divided into three parts: input matching network, amplifier network and output matching network. Filters are used in input matching part to provide low input reflection coefficient (S11) for wideband performance and low noise characteristics. The output matching part of LNA is responsible for decreasing output reflection coefficient (S22). Different kinds of techniques exist for amplifier network of CMOS LNA to provide high and flat gain, low power consumption and low noise figure.

The third order Chebyshev filter topology is used for wideband input matching. Chebyshev filter requires a number of reactive elements in input stage of LNA, which requires large on chip area and generates large amount of thermal noise [2]. To improve the performance of wideband input matching network, RC shunt-shunt feedback topology is used [3], [4]. The distributed topology of LNA provides wideband input matching, large power consumption, large on chip area and high noise figure [5]. To compensate the effect of high power consumption, the current reuse topology is used in LNA design which requires no external biasing. Current reuse topology is widely used in cascoding topology to eliminate the miller effect [8] as well as to provide high and flat gain, low power consumption and low noise figure, [1], [6].

This paper presents a performance of LNA using 0.18μm CMOS technology for UWB receiver. The analyses and designing of proposed circuit is shown in section 2 and section 3 shows the simulation result of gain, noise figure, reflection coefficient, isolation and group delay. Conclusion of LNA is given by section 4.

2. CIRCUIT DESIGNING

Inductive source degeneration topology is used in proposed circuit for wide-bandwidth input matching and low power consumption shown in Fig.1.

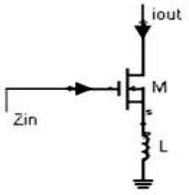

Fig.1. Inductive source degeneration [7]

The input impedance of the circuit (Z_{in}) and inductor L is selected to obtain desired input resistance (R_{in}) of 50Ω in Fig.1. The C_{gs} and g_m represents gate to source capacitance and trans-conductance of the transistor *M*.

$$Z_{in} = sL + \frac{1}{sC_{gs}} + \frac{g_m}{C_{gs}}L \tag{1}$$

The current reuse cascoding topology and two stage cascading topology is used in proposed LNA design as shown in Fig.2.

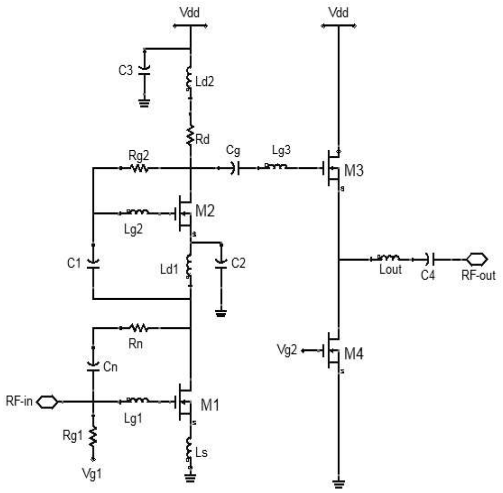

Fig.2. Proposed CMOS LNA circuit diagram

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RESEARCH ARTICLE

DESIGN OF ENERGY EFFICIENT RANDOM ACCESS MEMORY CIRCUIT USING STUB SERIES TERMINATED LOGIC I/O STANDARD ON 28NM FPGA

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SSTL,
FPGA,
IO Standard.

ABSTRACT

This paper is based on the designing of energy efficient memory circuit using various IO standard of SSTL logic family on 28nm (Artix-7) Field Programmable Gate Array (FPGA). We are using Xilinx ISE simulator version 14.2, Verilog hardware description language and Artix-7 FPGA. Six different SSTL IO standard are compared with each other to find the most power efficient among them. The design has been tested for power consumption at different operating frequencies as of Intel processor that are at Intel I-3 5005U 2.0 GHz, Intel I-3 5015U 2.1. GHz, Intel I-3 5157U 2.5 GHz, Intel I-5 3380M 2.9 GHz, Intel I-5. 3340U 3.1 GHz and Intel I-7 3370K 3.5 GHz to check the compatibility of the design with processors available in the market and to find most efficient IO standard at different operating frequencies and at two different temperatures i.e. 25°C and 50°C.

INTRODUCTION

RAM stands for Random Access Memory, it is now an integral part of the electronic systems (1). It is fast memory with volatile in nature (5). It makes the access of data and system faster. There are two kinds of RAM, Static RAM and Dynamic RAM. There are various IO standard families present with different feature sizes (channel size of transistor) and therefore the selection of correct family among the various different families is very important to design most power efficient digital circuit (8). In this paper, we are using SSTL IO standard logic family. Stub Series Terminated Logic is an input/output standard which is used to match the impedance of the line, port and device of the device being undertaken (6). Therefore, selection of most efficient SSTL logic family among different available class of SSTL logic family plays a very important role for making energy efficient design (10). This paper is based on the implementation of RAM on XC7A100T device from Artix-7 FPGA family having feature size of 28nm (7) and -2 speed grades. Artix-7 XC7A100T device has 101440 logic cells, 4860 kb block RAM, 240 DSP slices and 300 IO pins. For designing energy efficient RAM, we have used SSTL IO standard. In this paper we are using six different IO standard as shown in Figure 1, they are SSTL 135, SSTL 135_R, SSTL 15, SSTL 15_R, SSTL 18_1 and SSTL 18_II. Each SSTL IO standard that we have used to design the RAM is analyzed for power consumption at 2 GHz, 2.1 GHz, 2.5 GHz, 2.9 GHz, 3.1 GHz and 3.5 GHz operating frequency. This approach will help us to find the most power efficient SSTL IO standard and its compatibility with Intel I series processors.

The six different processors whose operating frequency we are using are Intel I-3 5005U 2.0 GHz, Intel I-3 5015U 2.1 GHz, Intel I-3 5157U 2.5 GHz, Intel I-5 3380M 2.9 GHz, Intel I-5 3340U 3.1 GHz and Intel I-7 3370K 3.5 GHz. SSTL IO standard can avoid the transmission line reflection by matching the impedance of transmission line, device, input port and output port.

SSTL IO standard has already been used for power efficient design of various digital circuits like image ALU (Kumar *et al*., 2013), parallel integrator (Das *et al*., 2014), VCM (2013), ROM (2014), clock gated RAM (2013). The power dissipation in the RAM can be divided into two parts, static power and dynamic power. Dynamic power is the sum of clock, signal and input/output power. Total power dissipation is the sum of dynamic power and leakage power. In section IV power analysis is done for a constant frequency and different SSTL IO standard.

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Corpus ID: 212539464

COMPARISON OF POWER IN CMOS AND ADIABATIC FULL ADDER CIRCUITS USING 0.18µM TECHNOLOGY PARAMETERS

N. Sharan, Mandavi Gahlot, N. Sharan • Published 2016

This paper presents the design and power comparison of charge-recovering adiabatic full adder circuits and CMOS logic based full adder circuit. The low-voltage Adiabatic Logic circuits have been designed for low-voltage, low-power dissipation and high-frequency operation. A comparative analysis was performed in which logic gates were constructed using adiabatic logic. A layout-based simulation was then performed to verify the operation. Simulation results have shown that the adiabatic logic… Expand

Figures and Tables from this paper

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Comparative Analysis of Leakage Reduction Techniques in Voltage Mode Current Latch Sense Amplifiers in Sram Cell

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Abstract

In present paper, the comparative analysis of different type of low power reduction techniques has been performed by implementing ir voltage mode and current latch sense amplifier 6-T SRAM cell. The low power reduction techniques have been realized in 6-T SRAM amplifiers using the 90-nm 1-V CMOS technologies. Total power dissipation of current latch sense amplifier is 14 µw which is 41.59 p less than the voltage mode sense amplifier. It has been found that Sleep transistor technique is very effective to reduce leakage powe well as total power dissipation in voltage mode sense amplifier. However, this technique is not so efficient to reduce total power dissip current latch sense amplifier. Furthermore, it has been observed that Dual Sleep method is more effective to reduce total power dissip current latch sense amplifier.

Keywords

Senseamplifier, Leakagepower dissipation, CLSA(currentlatchsenseamplifier), VMSA(voltagemode sense amplifier).

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DESIGN OF OSCILLATOR USING 0.18µm CMOS TECHNOLOGY FOR UWB SYSTEMS

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ABSTRACT

This paper gives the design of oscillator circuit using 0.18µm technology. The proposed oscillator has been designed using the active inductor topology. The Hartley oscillator technique has been implemented in the proposed circuit. The proposed oscillator circuit gives the oscillation frequency of 5GHz and the power consumption of the circuit is 11.599mW. The proposed circuit can be used for the UWB system whose frequency range is 3.1GHz-10.6GHz.

Keywords: *CMOS, Mixer, UWB*

I. INTRODUCTION

The oscillator are the circuits which are used to generate the frequency signal. The oscillator circuit must satisfy the Barkhausen criteria to get the sustained oscillation at the ouput. In RF receiver systems, the various blocks are connected as shown in Fig. 1.

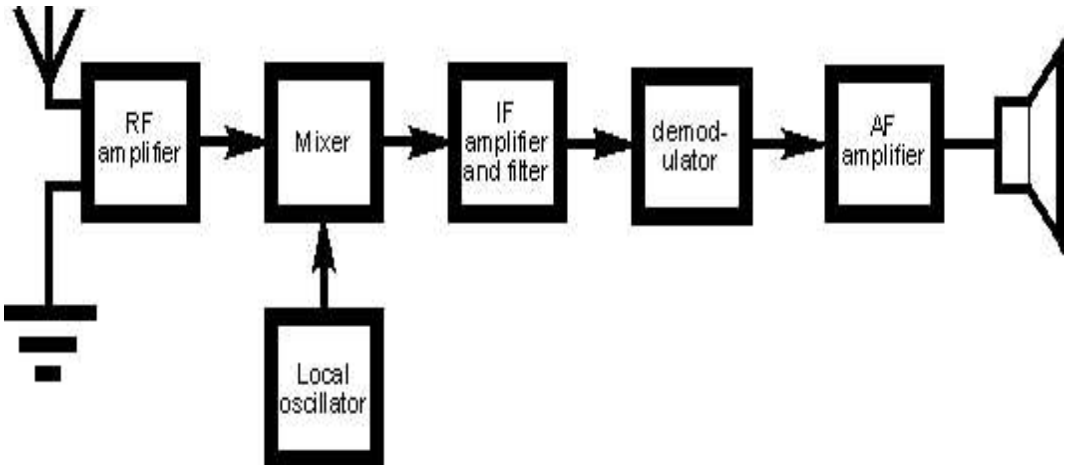

Fig. 1 Block Diagram of RF Receiver Systems

The block local oscillator gives input to the mixer and decides the frequency of mixer's output [2]. In receiver systems the frequency of mixer's output signal the frequency difference of local oscillator signal and RF signal. So, the quality of mixer's output depends on the RF signal as well as oscillator signal quality. There are various types of oscillators circuit for example RC oscillators, LC oscillators, crystal oscillator etc. The RC oscillator circuit is used to produce the signal frequency from KHz to MHz while LC oscillator circuit produce the signal frequency of MHz to GHz. The various LC oscillator circuit are Hartley oscillator and Colpitt oscillator. The

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A Novel investigation of building integrated photovoltaic thermal (BiPVT) system: A comparative study

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Abstract

In this paper, the expressions of room air temperature for building integrated photovoltaic thermal (BiPVT) system installed at the roof of a building have been obtained and at the same time performance evaluation of BiPVT has been investigated. A comparative analysis of Building integrated photovoltaic thermal system based on the arrays described namely (i) solar cell tile (SCT) array and (ii) semi-transparent PVT array has been carried out. In the earlier study; the performance analysis and comparison has been done for opaque and semi-transparent BiPVT systems with a single flow configuration (non-optimized), whereas in this study the evaluation has been done on optimized duct. It is important to note that the analysis of BiPVT roof with SCT array has been performed for the first ever time. It has been observed that the useful thermal energy gain for semi-transparent PVT roof is significantly higher than SCT roof. The highest useful thermal energy gain for semi-transparent PVT roof is higher by 2.0 kW h which reflects its higher heat removal characteristics.

Further, an attempt has been made to analyze the thermal load leveling (TLL) with respect to number of air changes (N_o) for both the systems. It has been observed here; that the thermal load leveling for both the systems breaks even at number of air changes less than four which implies that, for both the systems, thermal comfort is achieved when the number of air changes is less than four. Therefore, it can be well assumed that the optimum TLL may be achieved when it is lying between 3 and 4 number of air changes.

Keywords: BiPVT; SCT array; Semitransparent PVT array; Thermal load leveling

1. Introduction

The issues related to global warming, CO_2 emissions, depleting fossil fuel reserves are gaining serious concern in the current global energy scenario and hence, practices have been adopted to resolve these issues to reach to a sustainable solution. Incorporating renewable energy systems is one of the alternatives and is gaining momentum in the masses. Although PVTs are not as prevalent as solar thermal systems, the integration of photovoltaic and solar thermal collectors into the walls or roofing structure of a building could provide greater opportunity for the use of renewable solar energy technologies. Garg and Adhikari (1997) have presented a variety of results regarding the effect of design and operation parameters on the performance of air type PVT systems. Due to easier construction

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Performance augmentation in flat plate solar collector using MgO/water nanofluid

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ABSTRACT

In present work, testing of solar collector has been performed for MgO/water working fluid having particle size ~40 nm and particle volume concentration at 0.25, 0.5, 0.75, 1.0, 1.25 and 1.5% at 0.5, 1.0, 1.5, 2.0, 2.5 lpm respectively. Performance analysis of solar collector is based on first law of energy balance and qualitative nature of energy flow based on second law analysis. Parameters of performance analysis are chosen in order to examine both quantitative and qualitative characteristics of system performance. These parameters are thermal efficiency, energetic efficiency, pumping power, entropy generation; Bejan number and reduction in surface area. Experimental observation establishes thermal efficiency enhancement 9.34% for 0.75% particle volume concentration at flow rate 1.5 lpm. Exergetic efficiency enhancement observed 32.23% for same concentration and flow rate. Bejan number also reaches closer to unity (0.97) which throws light on systems qualitative response in terms of decline in entropy generation contribution due to internal irreversibilities and frictional heat loss. Entropy generation is 0.0611 W/K for 0.75% particle concentration compare to 0.1394 W/K for same flow rate and 0.071 W/K for 1.5% particle volume concentration. In this endeavor some penalty in form of rise in pumping power loss also incurred. 6.84% enhancement in pumping power loss observed for optimum flow rate and particle volume concentration which has not as much pronounced effect as enhancement in thermal efficiency and exergetic efficiency.

1. Introduction

Energy provides life sustaining and life propagating force to all living and non living beings. Whether industrial sector or domestic, energy is the fundamental necessity to perform various processes. Demand for energy consumption increasing every day in every nook and cranny. Conventional energy resources are limited and will fail to meet energy requirement of growing population and enhanced industrial activities for ever [2]. Hunt for new resources of energy always accompany with technological growth and its engineering applications. Development of energy efficient systems based on efficient materials has been major issue for scientists and engineers. Flat plate solar collectors are simplest in design, low cost and offer less maintenance among all types of collectors. Flat plate solar collectors basically used for heating of water by absorbing solar energy [3]. Conventional solar collectors, which uses water as heat absorbing and transporting medium, exhibits low thermal conversion efficiency. Thermal absorption efficiency and heat transportability capacity can be enhanced by employing new materials. Nanofluids, first introduced by Choi [4] have great potential to enhance heat absorption as well as transportation capacity. Since their inception, lot of research has been done with respect to application of nanofluid as heat absorbing and transport medium in heating and cooling systems. Experimental, computational and theoretical findings of researchers are highly promising. Tyagi et al. [5] observed 10% enhanced efficiency of DASC on absolute basis compare to flat plate solar collector using Al_2O_3/water nanofluid. Natrajan and Sathish [6] experimentally studied performance of CNT/water nanofluid with SDS as surfactant for solar water heating system and find that nanofluid based solar collector are more efficient compare to conventional one. Otanicar et al. [7] reported maximum enhancement in efficiency of DASC by 5% for Ag/water nanofluid (20–40 nm) at 0.5% volume fraction. Kameya and Hanamura [8] studied effect of Ni/water nanofluid as heat absorber. They found that absorption coefficient is much higher than that of base fluid in range of visible to near-infrared spectrum of solar radiation at 1.0 wt%, and ~4.9 nm particle size. Yousefi et al. [9] observed 28.3% enhancement in thermal efficiency of flat plate solar collector with Al_2O_3/water nanofluid at 0.25 wt%, size 15 nm for volume flow rate 2 l/min. Yosefi et al. [10,11] reported effect of pH variation on efficiency of solar collector when in their

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Stability Analysis of Twin Axial Groove Hybrid Journal Bearing

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ABSTRACT

Stability of rigid rotor supported on hybrid journal bearing with twin axial groove has been investigated using stiffness and damping coefficients of the bearings. In this paper the stability analysis of twin axial groove bearing is determined in different fluid flow regime. Non linear journal centre trajectories are drawn for small amplitude oscillations of the journal centre about its steady state position. It was observed that turbulence decreases 10 to 12 percent the stability margin of twin grooved journal bearings.

Keywords: Stability; Groove; Bearing; Laminar flow; Super laminar.

NOMENCLATURE

a	length of groove
$\overline{C}_{ij}$	non dimensionless damping coefficient
D	diameter of bearing
i,j	co-ordinate system used in analysis
$\overline{K}_{ij}$	non dimensionless spring coefficient
L	length of bearing
M	mass of bearing
Mc	critical mass of bearing
S_n	Somerfield number
W	width of groove
X_j , Z_j	instantaneous journal centre co-ordinates
$\dot{X}_j, \dot{Z}_j$	journal centre velocity
α_g	location of groove

1. INTRODUCTION

Stability is invariably an important consideration in most high speed rotating machinery. Motion trajectory of journal centre in the wake of a disturbance from the equilibrium position can give more insight into the dynamic behavior of a journal bearing system than a mathematical criterion that simply determines if a system is stable or unstable [6]. Morton *et al.* (1987) presented the influence of grooves in bearing on the stability and response of rotating systems. They found that grooved bearing modify the journal locus by increasing the attitude angle and it also change the cavitation boundary at low eccentricity ratios i.e. high speeds. Pai and Mazumdar (1991) analyzed the stability characteristics of submerged plain journal bearings under a unidirectional constant load and variable rotating load. They solved unsteady Reynolds equation by a finite difference method with a successive over relaxation scheme to obtain the hydrodynamic forces. Using these forces, the equations of motion were solved by the fourth-order Runge-Kutta method to predict the transient behavior of the rotor. Finally, they obtained journal centre trajectories for different operating conditions. It was that at the inlet, flow into the bearing takes place only in the unloaded region. At the outlet, flow takes place out of the bearing in the loaded region.

Das *et al.* (2005) presented the dynamic characteristics of hydrodynamic journal bearings lubricated with micropolar fluids. They concluded that higher threshold of stability is achieved in micropolar lubrication as compared to Newtonian lubrication. The threshold of stability gradually improves with more micropolar effect and the nonlinear analysis provides better stability than the linear analysis. Navthar and Halegowda (2010) presented a method to determine the synchronous whirl i.e. stability of hydrodynamic journal bearings by using dynamic characteristics such as stiffness

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Effect of variable spacing on performance of plate heat exchanger using nanofluids

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ABSTRACT

This paper presents details of an experimental investigation into the effect of different spacings ($\Delta X = 2.5$ mm, 5.0 mm, 7.5 mm and 10.0 mm) in plate heat exchanger (PHE) on the basis of its combined energetic and exergetic performance by using various nanofluids, i.e., TiO_2, Al_2O_3, ZnO, CeO_2, hybrid ($Cu+Al_2O_3$), graphene nanoplate (GNP) and multi-walled carbon nanotube (MWCNT). On the basis of experiment data, various energetic and exergetic performance parameters have been evaluated and their inter-relationship has been discussed. The optimum heat transfer characteristics in the nanofluids and their exergetic performance have been found to be achieved with a spacing of $\Delta X = 5.0$ mm. Based on these data, it has been found that the MWCNT/water nanofluid, with a spacing of $\Delta X = 5$ mm in PHE, has the maximum heat transfer coefficient, which is 53% higher compared to water at 0.75 vol % (optimum). Nanofluids significantly improve heat transfer capacity with a nominal rise in pressure drop at 0.75 vol %. This study will help to understand the process of heat transfer augmentation by using various nanofluids in the PHE on the basis of energetic and exergetic performance of the system.

1. Introduction

The phenomenon of heat transfer is common in many engineering applications which are carried out with the help of various appliances, including plate heat exchanger (PHE). A PHE consists of a number of thin corrugated plates. Each plate has port holes providing a passage for flowing fluids. The corners of the plates are sealed with gaskets to support the interplate channels directing fluids into alternate channels.

The plates of a PHE are held together between a fixed frame plate and a moving pressure plate. They are clamped together by compression with a bolt which compresses the gaskets, thus, making a seal. The transferring of heat takes place through the plate between the channels. The objective behind corrugation of the plates is to enhance the turbulence, thereby increasing heat transfer and strengthening the plate pack [1,2].

The efficacy of heat transfer in a heat exchanging equipment greatly depends on the thermophysical properties of working fluids [3]. Due to inherent properties of high thermal conductivities, enhanced heat transfer coefficient (HTC) and a small penalty of pressure drop, nanofluids have been widely used as coolant for the last two decades [4–9].

Picon-Nuñez et al. [10] studied designing of plate fin heat exchanger (PFHE) with two different surfaces (Plain-fin and louvered fins), based on the volume performance index at various Reynolds numbers. The effect of the plate geometry (angles, depth and types of corrugation) of a PHE on heat transfer characteristics under turbulent conditions for different Reynolds numbers and Prandtl numbers was investigated by Khan et al. [11]. They found a significant effect of plate geometry on the heat transfer performance. Faizal and Ahmed [12] studied the process of optimum heat transfer by varying the spacing between the plates in PHE. Their findings revealed that the optimum heat transfer occurred at a minimum spacing for water-water stream in PHE. Abed et al. [13] carried out a numerical study on the heat transfer performance in corrugated trapezoidal PHE. They used various nanomaterials (Al_2O_3, SiO_2, CuO and ZnO) with volume fractions 0–4.0% and particle diameter 20–80 nm under turbulent flow conditions. Their results established that the heat transfer rate increases with an increased volume fraction of nanofluid. However, the pressure drop increases with decreased diameter of nanoparticles.

The performance of heat transfer of nanofluid (Al_2O_3/water) as a cooling medium in corrugated PHE was examined by Tiwari et al. [14,15]. Pandey and Neema [16] observed that addition of

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Effects of functionalization on the mechanical properties of multiwalled carbon nanotubes: A molecular dynamics approach

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Abstract

Carbon nanotubes have been proposed as an ideal reinforcement for the fabrication of nanocomposites. However, because of their chemical inertness, carbon nanotubes have to be functionalized in order to acquire superior properties. In the present paper, we examine the effect of functionalization of single-, double-, and triple-walled carbon nanotubes with ethylene-di-amine, analyzing their elastic properties. Condensed-phase optimized molecular potentials for atomistic simulations studies force field is used to model the interatomic interactions for armchair (5,5), (9,0), and (10,10) configuration carbon nanotubes. Molecular dynamics simulations for carbon nanotubes with various densities of the attached ethylene-di-amine molecules have been performed. This study quantitatively investigates the effect of amine functionalization (up to 12 numbers of ethylene-di-amine groups) on the Young's, bulk, and shear moduli and tensile strengths of different carbon nanotube structures.

Keywords

Nanostructures, molecular dynamics, mechanical properties, computational modeling, functionalization, elastic properties

Introduction

Several research studies have been conducted recently, on carbon nanotubes (CNTs), mostly because of their unique physical, mechanical, and electronic properties. CNTs have also been proposed as an ideal reinforcement along with the fiber and matrix in three-phase composites. This leads to obtain nanocomposites with improved mechanical, electrical, and/or thermal properties. However, there are many challenges that need to be addressed to use CNTs as an effective reinforcement in polymer nanocomposites. The dispersion of CNTs is one of the most widely acknowledged difficulties. Agglomeration due to van der Waal's (vdW) interaction between CNTs and the poor load transfer through the CNT–matrix interface are some of the other unsolved problems.[1,2] Therefore, this results in overall poor mechanical properties of epoxy nanocomposites, so it is always suggested to make a bridge in between the reinforcing material and epoxy. Though sometimes pristine nanofiller is not able to provide apposite strength to the composites, thus it is necessary to provide surface treatment to carbon nanofiller. Chemical functionalization may be a viable solution to achieve good dispersion as well as a strong adhesive interface between the CNTs and surrounding polymer chains. The presence of 5.0% functionalized Multi-walled carbon nanotube (MW-CNT) leads to an increase in ultimate tensile strength and strain to failure compared with the neat carbon fiber/epoxy resin.[3] The

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Development of Nano-Structured Metals Processed by Severe Plastic Deformation

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Abstract

Severe Plastic Deformation is the most promising technique which can produce Bulk Nano-Structured Materials (BNMs). Among various SPD techniques Accumulative Roll Bonding (ARB) and Equal Channel Angular Pressing (ECAP) have a broad significance due to its unusual mechanical performance. In this paper, the principle and merits of ARB and ECAP technique are pointed out, and also a model based on simulation is established for investigating SPD developments. Pure Copper after sixteen numbers of ARB cycles discloses greater strength by more rises in ductility as compared to that of coarse-grained metals. Similarly in pure Titanium after five numbers of ARB cycles incredibly substantial increase in strength together with an only small decrease of ductility has obtained. The result shows that it is achievable to get high strength, except only with significantly reduced ductility.Additionally, a simulated model, founded on lattice defect kinetics has established. This model holds true parameters like dislocation density, vacancy concentration, grains size, etc., found appropriate for the grain refinement throughout and after the SPD process of simulation. It presents quantitatively consistent outcome for the hardening performance and micro-structural development in pre and post SPD deformation. The new results of SPD-processed nano-structured materials are elucidated, particularly considering viable uses. The advantages of nano-structured metals and alloys mostly for aerospace engineering, automotive engineering, electronic industry and for biocompatible are pointed out such as improved hydrogen storage kinetics (Mg-alloys) for fuel cell technology, superior magnets, Ti, Mg-alloys for prostheses, implants, and stents, etc.

Keywords: Accumulative Roll Bonding, Hydrogen Storage, Nano-structured Materials, Severe Plastic Deformation, Simulation and Modeling

1. Introduction

Severe plastic deformation involves tremendous strain at comparatively low temperature and develops nano-structured material with a significant grain size up to a few hundred nm. As a result, its physical properties are enhanced extensively. In conventional processes, for example rolling, forging, drawing, extrusion, etc. the main disadvantage of these processes is the product cannot achieve without any defects. Earlier attempts to produce nano-structured material followed some of the methods like; inert gas condensation, high-energy ball milling with subsequent consolidation, electro-deposition and crystallization from an amorphous state[1,16]. Though, all mentioned methods recognized as 'Bottom-up Approach' are not capable of achieving the correct dimensions of the sample. Besides this, a number of complexities such as residual porosity, impurities and exposure to hazardous nano-powder, is prohibited these techniques from getting realistic uses, as well as the reality that they are not match for manufacture on an industrial level. About few decade back, an adaptive alternative approach called as

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Bonding Characteristics of Al and Al-Alloy Strips: Processed by Severe Plastic Deformation

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Abstract— In this paper, the study of efficient bonding characteristics of AA6014 and AA1050 metal strips is carried out for Accumulative Roll Bonding (ARB) process. Among various Severe Plastic Deformation (SPD) techniques, ARB process is widely used due to its ability to produce ultra-fine grained (UFG) or nanostructured bulk material. It has been observed that, if the experimental pressure and corresponding temperature achieve their respective threshold values, then the bonding can be successfully joined as compared to the solid state welding.

Keywords- Composite Metal Sheet, Ultra-Fine Grained (UFG), Nano-Structured Material, Severe Plastic Deformation, Accumulative Roll Bonding

I. INTRODUCTION

Accumulative Roll Bonding (ARB) is the solid-state bonding process applied to joining similar or dissimilar metal strips by rolling. These are easy and low-cost fabrication methods for mass production of sheet metals. It is possible to fabricate ultra-fine grained (UFG) or nano-structured material products by applying the accumulative roll bonding process. Other SPD process such as Equal Channel Angular Pressing (ECAP) [1], High Pressure Torsion (HTP) [2], Cyclic Extrusion Compression (CEC) [3], Twist Extrusion (TE) [4], Continuous Confined Strip Shearing[5], and Mechanical Milling processes[6], have the following drawbacks. Firstly, the above pointed out processes are found to be improper to produce bulk materials. Secondly, the required forming dies are quite expensive, and also the required forces are very high. As compared to the above processes, ARB has no such inadequacies. In order to produce ultrafine grained bulk aluminum sheets, the ARB process was at first suggested by Saito et al. [7] then it was modified successfully by Tsuji et al. [8] by producing UFG bulk sheet of interstitial free (IF) steel, which had the average grain size less than 1μm. Hongzhi et al. [9], [16] stated the development of efficient joining of Al 6111 alloy which reveals high shear strength compared to the parent alloy. The four fundamental controlling factors of the roll bonding process were annelid temperature, inlet temperature, rolling speed and the percentage of reduction. Among the above four factors, the rolling temperature was found to be the important element influencing accumulative roll bonding. Saito et al. [10] have carried out the same research with AA5083, IF steel and AA1100. The outcome shows that the strength of AA1100, increased after eight cycles, from 84 MPa to 304 MPa, but the elongation decreased from 42 % to 8 %. The strength of AA5083 rose from 318 MPa to 550 MPa after seven cycles and elongation decreased from 25 % to 6 %, but for IF steel the strength increased to 751 MPa from 274 MPa after five cycles, whereas the elongation decreased from 56 % to 6 %. Tsuji et al. [11], [17] suggested that the true strain reaches 4.0 at 200°C, and average grain size decreases up to 280 nm. Eizadjou et al. [12] experimentally examined the bond strength by peeling of AA1100. Also, AA1100 strips were enhanced its strength with an increase of overall reduction in thickness and temperature. Ultimately the peel strength achieved the value of base metal strength. The bond strength was increasing by increasing the rolling temperature having the constant reduction in the percentage of the thickness of bi-layered strips of two Al1100 and Al1100. The application of significant plastic deformation on two types of metals like aluminum and steel to produce the cold roll joining has used by Manesh et al. [13]. The sheet was work hardened and then annealed to attain higher ductility. It has suggested that the heat treatment of the sheets were difficult because of the growth of a brittle intermetallic compound in between Al and iron. The inter-metallic phase thickness strength has increased by increasing the annealing temperature having the constant duration of time. It has established by Movahedi et al. [14], [18] that better controlled anneals temperature up to 400°C can improve the joining strength. As a result, the above-discussed studies have concluded the experiments on grain refinement shear strength enhancement, peel strength improvement, essential controlling factors of accumulative roll bonding and increases in ductility as well as formability by annealing, but there is a need for research which has been identified on minimum bonding criteria for ARB. Therefore, the current study gave priority to find out threshold considerations for accumulative roll bonding

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Analysis

Investigation of coefficient of skin friction and axial velocity of fully developed turbulent flow through pipe

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A Review on RAM (Reliability, Availability, and Maintainability) Analysis, its Applications and its Incorporation in the Modern World

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***Abstract*- This review paper focuses on the significance of RAM (Reliability, Availability, and Maintainability) analysis in all fields and it also tries to explain its existence in the modern world. The three factors reliability, availability, and maintainability together helps to manage a system effectively if all three are taken good care of separately and their combined effects and profits are evaluated with respect to system requirements, overall functioning and productivity in the long run. Therefore, RAM analysis is of great importance nowadays to effectively coordinate all the functions without any unexpected system failure. This paper also outlines the applications of RAM analysis being used in various fields and how it has been incorporated successfully in all these fields.**

***Index terms*- Existence, RAM analysis, System requirements, Unexpected system failure**

I. INTRODUCTION

RAM (Reliability, Availability, and Maintainability) analysis has become a root framework for the industries or for any organization. Those organizations which follow RAM analysis as their tool for solving problems, maintaining machinery and managing the system have more probability of survival in the market, as they can easily reduce the costs related to the repairs of machinery, new machinery or new component again and again. This helps them to focus on the processes, materials, tools, and new and better ways to increase the productivity of the entire system and consequently of the whole organization. Therefore, RAM analysis can be applied to activities/stages relating to both pre-production and post-production phase of any industry.

Reliability, availability, and maintainability (RAM) are the three factors which affect the whole organization in a number of ways. These three different terms possess different utilities and significance to a system. These also affect the life cycle costing to any system. RAM analysis can be used to predict the performance of a system. It can provide with a view to the engineers about the systems functioning capabilities, its flaws, and the subsystems which require more maintenance. It can also be used to identify about the functioning life cycle of equipment, type of maintenance to be performed, design the overall maintenance schedule, and creating an estimate about the total availability of the system. For all of this, it requires a complete failure data of system, subsystem, and its components. RAM analysis, in all, is a complete solution to increasing the life, maintainability, and performance of the system. Furthermore, sometimes it also uses other sets of reliability models, maintainability models, and other types of analysis such as FMEA (Failure Mode and Effect Analysis) and hazard analysis.

In this paper, a review has been done on various research papers of last ten years, focusing on using RAM analysis as their tool and incorporating it in research and technological advancements so as to solve a problem and improve the performance of a system. This paper identifies RAM as a useful tool to be applied in each and every analysis part of any organization or any industry. This paper aims to headline the useful aspects and applications of RAM analysis. It also shows that how it has been applied in

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Prediction of output parameters in wire electrical discharge machining of EN-31 steel by artificial neural networks

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Abstract

The objective of this work is to predict the effect of input parameters on output parameters using artificial neural network in wire electrical discharge machining. The input variables considered are peak current, pulse on time, flushing pressure of dielectric, pulse off time, wire tension and wire feed rate. The output variables taken into consideration are dimensional deviation and material removal rate. Workpiece used in the study is of EN-31 steel. Wire electrical discharge machining is a thermal cum electrical process and uses the electrical and thermal energy for cutting materials. Wire electrical discharge machining is utilised for cutting electrically conductive materials, which are difficult to machine with conventional machining methods. This process uses discrete electrical discharges between continuously travelling wire (tool) and the workpiece for cutting the workpiece. In this work, artificial neural networks are used for prediction of output parameters. Artificial neural networks have a highly connected set of nodes or processing elements that operate in parallel. Artificial neural networks can be trained using input and output data and can be used to predict data for new input values.

Keywords

Wire electrical discharge machining, EN-31, Effect of input parameters, Output parameters, Artificial neural networks.

1.Introduction

Wire electrical discharge machining (WEDM) is a unconventional process of machining. It is utilised in conditions where workpiece is very hard to cut by conventional machining processes. This process machines electrically conductive materials [1]. The machining is carried out by controlled electrical sparks in a dielectric medium [2]. No stresses are developed in this process because there is no physical contact between the tool and the workpiece. When potential difference is applied between the tool and the workpiece the dielectric breaks down allowing the flow of spark, which causes erosion on workpiece and on tool also. The magnitude of erosion is more on the workpiece than on the tool (i.e. constantly travelling wire). Wire electrical discharge machining is a complex process owing to the number of variable that control the process.

Different parameters have different degree of effect on the output parameters, which makes the selection of parameters cumbersome for the machine operators. This in turn affects the efficiency with which machining can be done. *Figure 1* shows the block diagram of wire EDM machine.

Artificial neural networks (ANNs) have a number of highly interconnected processing units called as neurons [3]. The overall behaviour of ANNs is analogous to the human brain [3]. ANNs can be trained using data sets. From these data sets they can learn and generalise the underlying relationship between the input and output data. ANNs can be utilised where the relationship between input and output data is hard to establish by conventional statistical methods. These networks are trained using already available data in the form of inputs and outputs, ANNs then use this data to train themselves, which can then be used to predict the data for a different set of values. Artificial neural networks can also handle inexact and noisy data. *Figure 2* shows the layout of artificial neural network.

Singaram Lakshmanan et al. optimized the surface roughness using response surface methodology for EN-31 tool steel [4]. Arunkumar et al. investigated the process parameters for machining EN-31(air-hardened steel) [5]. Harpuneet Singh investigated the effect of different electrodes on EN-31[6]. Malhotra

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Effect of chevron angle on heat transfer performance in plate heat exchanger using ZnO/water nanofluid

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https://doi.org/10.1016/j.enconman.2016.03.086

Highlights

- An experimental test loop has been constructed to study the PHE thermal characteristics.
- For a given heat duty, the nanofluid volumetric flow rate required is lower than that of water.
- For a given pumping power, more heat could be removed by the nanofluids.
- Nanofluids may be a good choice for heat transfer fluid because of higher exergy efficiency.

Abstract

1413 (11)

Journal of Cleaner Production
Volume 127, 20 July 2016, Pages 1-18

Review

Effects of Minimum Quantity Lubrication (MQL) in machining processes using conventional and nanofluid based cutting fluids: A comprehensive review

Anuj Kumar Sharma [a], Arun Kumar Tiwari [b], Amit Rai Dixit [a]

https://doi.org/10.1016/j.jclepro.2016.03.146

Abstract

In any metal cutting operation, the cutting fluid plays a vital role by cooling the surface of the work piece and the cutting tool, removing chips from the cutting zone and by lubricating the tool–work piece interface. However, misuse of the cutting fluid and wrong methods of its disposal can affect human health and the environment badly. Also, it accounts for 16–20% of the total cost of manufacturing in the production industry. Among various techniques available on application of the coolant, researchers, of late, have been focussing on Near Dry Machining (NDM)/Minimum Quantity Lubrication (MQL) as it minimizes the use of coolant by spraying the mixture of compressed air and cutting fluid in an optimized manner instead of flood cooling. The MQL technique has proved to be suitable because it complies with the requirements of 'green' machining. This paper presents a review of the important research papers published regarding the MQL-based application of mineral oils, vegetable oils and nanofluid-based cutting fluids for different machining processes, such as, drilling, turning, milling and grinding, etc. The paper explains the mechanism of the MQL technique. In a systematic manner, the present work also discusses its effect on the performance parameters of

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Renewable and Sustainable Energy Reviews
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Rheological behaviour of nanofluids: A review

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Abstract

A colloidal mixture of nanometre-sized (<100 nm) metallic and non-metallic particles in conventional fluid is called nanofluid. Nanofluids are considered to be potential heat transfer fluids because of their superior thermal and tribological properties. In recent period, nanofluids have been the focus of attention of the researchers. This paper presents a summary of a number of important research works that have been published on rheological behaviour of nanofluids. This review article not only discusses the influence of particle shape and shear rate range on rheological behaviour of nanofluids but also studies other factors affecting the rheological behaviour. These other factors include nanoparticle type, volumetric concentration in different base fluids, addition of surfactant and externally applied magnetic field. From the literature review, it has been found that particle shape, its concentration, shear rate range, surfactant and magnetic field significantly affect the rheological behaviour of any nanofluid. It has been observed that nanofluids containing spherical nanoparticles are more likely to exhibit Newtonian behaviour and those containing nanotubes show non-Newtonian flow behaviour. Furthermore, nanofluids show Newtonian behaviour at low shear rate values while behave as non-Newtonian fluid at high shear rate values. Authors have also identified the inadequacies in the research works so far which require further investigations.

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1415

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Experimental investigation of heat transfer and pressure drop in a circular tube with multiple inserts

Chaitanya Vashistha, A. Patil, Manoj Kumar · Published 2016 ·
Materials Science · Applied Thermal Engineering

The heat transfer ability of a convectional heat exchanger needs to be improved in order to transport a desired rate of energy at the reduced size and cost. Among the different means to increase the heat transfer coefficient, use of inserts emerged as a promising technique to bring out the enhancement in heat transfer at the cost of bearable increase in frictional losses. The present work aims to investigate the heat transfer and fluid flow characteristics of a circular tube fitted with... Expand

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Experimental Heat Transfer >
A Journal of Thermal Energy Generation, Transport, Storage, and Conversion
Volume 30, 2017 - Issue 1

Articles

Heat transfer and friction factor correlation development for double-pass solar air heater having V-shaped ribs as roughness elements

A. Sharma, G. Bharadwaj & Varun

Pages 77-90 | Received 16 Mar 2015, Accepted 24 Feb 2016, Accepted author version posted online: 31 Mar 2016, Published online: 27 Sep 2016

Mechanical Anisotropy of Aluminium AA1050 and Aluminium Alloy AA6016 produced by Accumulative Roll Bonding

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Abstract- The present work investigates the plastic flow anisotropy of pure aluminium AA 1050 and aluminium alloy AA6016 followed by eight cycles of Accumulative Roll Bonding (ARB) at room temperature. Samples were oriented with their strong basal pole texture aligned with rolling direction, perpendicular (900) to the rolling direction and 450 to the rolling direction. The plastic anisotropy has been investigated by tensile deformation via the Lankford parameter. The average normal and planar anisotropies slight increase from 0.62 to 0.91 and decrease from 0.60 to −0.70 as a function of ARB cycles, respectively. Results are compared with those from experiment and discussed with regard to strain rate sensitivity.

Keywords – Accumulative Roll Bonding, Mechanical Anisotropy, Nano- Structured Materials, Lankford parameter, Aluminium

I. INTRODUCTION

Severe plastic deformation involves very large strain at a comparatively low temperature and develops nano-structured material with a significant grain size up to a few hundred nm, as a result its physical properties are enhanced extensively. In conventional methods, such as in rolling, forging, drawing or extrusion processes these requirements cannot be achieved without any defects. Primary attempts to produce nano-structured material followed a number of methods like; inert gas condensation, high-energy ball milling with subsequent consolidation, electro-deposition, and crystallization from an amorphous state. However, all these mentioned methods recognized as 'Bottom-up Approach' are not capable to achieve the correct dimensions of the sample. Besides this, a number of complexities such as residual porosity, impurities, and exposure to dangerous nano powder, have prohibited these techniques from reaching realistic applications, in addition to the reality that they are not matched for manufacture on an industrial scale. In the last few years, an adaptive alternative approach called as 'Top-down Approach' has been innovated, which works on the principle of Severe Plastic Deformation (SPD), This approach has achieved significance due to direct conversion of metals and alloys with conventional grain sizes of nano-scaled materials with exceptional new properties [1]. Other SPD techniques, such as, Equal Channel Angular Pressing (ECAP) [2], High Pressure Torsion (HTP) [3], Cyclic Extrusion Compression (CEC) [4], Repetitive corrugation and straightening of sheet metals [5] Continuous Confined Strip Shearing and Mechanical Milling processes [6] are have some drawbacks. Firstly, the above pointed out processes are found to be improper to produce bulk materials. Secondly, they required forming dies, which are quite expensive and also the required very high forces. As compared to the above processes, ARB has no such inadequacies. In order to produce ultrafine grained and /or nano-structured bulk aluminium sheets, the ARB process was at first suggested by Saito et al. [7] then it was modified successfully by Tsuji et al. [8] by producing UFG bulk sheet of interstitial free (IF) steel. The present work aims at studying the development of texture thoroughly in AA1050 and AA6016 as a function of ARB cycles. This metal is often used in the automotive industry and aerospace industries for body panels. Therefore, based on the Taylor factor and the calculated Lankford parameter, the mechanical anisotropy of the advanced metal sheets is discussed.

1418 (16)

Article PDF Available

Dissipation index and efficiency of free hydraulic jump in horizontal prismatic channel: an experimental approach

May 2016

Authors:

Sanjeev Kumar Gupta
GLA University

Vijay Dwivedi
GLA University

References (14) Figures (3)

Abstract and Figures

This study has been carried out in the Hydraulic Laboratory, Department of Applied Mechanics, MNNIT Allahabad for Froude number ranged from 2 to 8 and incoming Reynolds number 8000 to 25000 to find out non – dimensional relationship for dissipation index and efficiency of free hydraulic jump in horizontal prismatic channels. The developed empirical computational models of dissipation index and efficiency of free hydraulic jump are validated using Bhutto (1987) data.

Schematic Layout of... | ariation of Dissipati... | ariation of Efficiency...

Figures - uploaded by Sanjeev Kumar Gupta

Author content

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Bending behavior of Orthotropic Skew Plate subjected to Point Load

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Abstract-**Present paper deals with defection analysis of orthotropic skew plate using FSDT. A polynomial radial basis function base meshfree method is used to discretize the partial differential equations in displacement form. A MATLAB code is developed incorporating to obtain the solutions. Results related to flexure analysis of orthotropic skew plates are presented under point load. Effect of orthotropic ration, skew angle and span to thickness ratio is presented.**

Index Terms- **Skew plate, Orthotropic, FSDT, Meshfree, Point Load**

I. INTRODUCTION

Plates are defined as plane structural elements with a small thickness. Plate deformation theories can be divided in to two groups: stress based and displacement based theories. Due to the presence of singularity at the obtuse corners skew plates are complicated then rectangular plates. Skew plates have several numbers of applications in various mechanical, civil and aero structures such as ship hulls, buildings, aircrafts etc. The present paper deals with the skew plates under point load. Analysis of skew plate using point load is a rare study in the field of research. Ferreira et al. [1] use the FSDT in the multiquadric radial basis function (MQRBF) procedure for predicting the free vibration behavior. Sengupta [2] has studied the performance of a simple finite element for the analysis of skew rhombic plates. Bending analysis of simply supported shear deformable Skew plates have been carried out by Liew and Han [3]. The spline-finite-strip/element method has also been applied to the bending analysis of skew plates (Tham et al. [4]; Li et al. [5]; Wang and Hsu [6]). Daripa and Singha [7] studied the influence of corner stresses on the stability behaviour of composite skew plates. The analysis of isotropic thick skew plates had been carried out by Muhammad and Singh, [8].Srinivasa et. al. [9] studies the buckling effect on skew plates using finite element.

II. MATHEMATICAL FORMULATION

The plate geometry of is shown in Fig. 1. Thickness h is along z axis whose mid plane is coinciding with x-y plane of the coordinate system is considered.

The displacement field at any point in the plate is expressed as ignoring initial displacements in X and Y direction:

$$u = -z\phi_x$$
$$v = -z\phi_y$$
$$w = w_0$$

(1)

The strain-displacement relations can be written as:

$$\begin{Bmatrix} \varepsilon_{xx} \\ \varepsilon_{yy} \\ \gamma_{xy} \end{Bmatrix} = \begin{Bmatrix} -z\dfrac{\partial \phi_x}{\partial x} \\ -z\dfrac{\partial \phi_y}{\partial y} \\ -z\dfrac{\partial \phi_x}{\partial y} - z\dfrac{\partial \phi_y}{\partial x} \end{Bmatrix}$$

(2)

$$\begin{Bmatrix} \gamma_{yz} \\ \gamma_{zx} \end{Bmatrix} = \begin{Bmatrix} -\phi_y + \dfrac{\partial w_0}{\partial y} \\ -\phi_x + \dfrac{\partial w_0}{\partial x} \end{Bmatrix}$$

(3)

The constitutive stress strain relation can be written as:

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Article

Microstructure Evolution During Hot Deformation of a Micro-Alloyed Steel

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DOI:10.1007/s12666-016-0895-7

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Citations (3) References (42)

Abstract

In the present investigation, hot deformation by uniaxial compression of a microalloyed steel has been carried out, using a deformation dilatometer, after homogenization at 1200 °C for 20 min up to strains of 0.4, 0.8 and 1.2 at different temperatures of 900, 1000 and 1100 °C, at a constant strain rate of 2 s−1 followed by water quenching. In all the deformation conditions, initiation of dynamic recrystallization (DRX) is observed, however, stress peaks are not observed in the specimens deformed at 900 and 1000 °C. The specimens deformed at 900 °C showed a combination of acicular ferrite (AF) and bainite (B) microstructure. There is an increase in the acicular ferrite fraction with increase in strain at all these deformation temperatures. At high deformation temperature of 1100 °C, coarsening of DRXed grains is observed. This is attributed to the common limitations involved in fast quenching of the DRXed microstructure, which leads to increase in grain size by metadynamic recrystallization (MDRX). The strain free prior austenite grains promote the formation of large fraction of both bainite and martensite in the transformed microstructures during cooling. The length and width of

20

1422

Article PDF Available

Evaluation of mechanical properties of single-walled carbon nanotube/HDPE-P5300 composites using molecular dynamics

April 2016
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Authors:

Vijay Dwivedi
GLA University

Abstract and Figures

High Density Polyethylene-P5300 (HDPE) possesses superior mechanical properties. However, these properties may be further increased by introducing single walled carbon nanotubes (SWCNTs) as reinforcement filler. The study conducted here is based on molecular dynamics (MD) simulations performed on SWCNTs/ HDPE composites. Modeling and simulations are performed on three different samples of SWCNTs/ HDPE composites with SWCNT variation from 0.0 to 2.0 wt.%. This study investigates the effect of SWCNT wt. % on the young's modulus, bulk and shear modulus of SWCNTs /HDPE composites. A maximum value of 1.64 GPa of Young's modulus with 2.0 wt.% SWCNT/HDPE composite has been obtained, as compare to pure HDPE composite. Considerable increment of 10.5% and 12.4% with respect to pristine has also been observed for 2.0 wt.% sample in shear and bulk modulus respectively. Overall, the agreement between predicted values of the material properties and experimental data obtained from the industrial research is found satisfactory. This study will assist in the modeling, simulation and design of advanced nanotube reinforced HDPE composites for potential real life applications, particularly in high pressure pipes applications.

: Predicted

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NUCLEI, PARTICLES, FIELDS, GRAVITATION, AND ASTROPHYSICS

Anisotropic String Cosmological Model in Brans–Dicke Theory of Gravitation with Time-Dependent Deceleration Parameter[1]

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Abstract—We discuss a spatially homogeneous and anisotropic string cosmological models in the Brans–Dicke theory of gravitation. For a spatially homogeneous metric, it is assumed that the expansion scalar θ is proportional to the shear scalar σ. This condition leads to $A = kB^n$, where k and n are constants. With these assumptions and also assuming a variable scale factor $a = a(t)$, we find solutions of the Brans–Dicke field equations. Various phenomena like the Big Bang, expanding universe, and shift from anisotropy to isotropy are observed in the model. It can also be seen that in early stage of the evolution of the universe, strings dominate over particles, whereas the universe is dominated by massive strings at the late time. Some physical and geometrical behaviors of the models are also discussed and observed to be in good agreement with the recent observations of SNe Ia supernovae.

DOI: 10.1134/S1063776116110157

1. INTRODUCTION

In the original Newtonian theory of gravitation, the gravitational acceleration a generated by a body of mass M at a distance r is directly proportional to the mass M and inversely proportional to the square of the distance r, $a = GM/r^2$, where G is the proportionality coefficient called the gravitation constant. In the general theory of relativity, the gravitational field and hence the gravitational acceleration a was also assumed to be the same. But in the vicinity of several distant astronomical bodies, the real gravitational accelerations based on the observable mass M_{obs} was found to be much larger than what was predicted, $a \gg GM_{obs}/r^2$. To explain this problem, it was traditionally assumed that, in addition to the observable masses, there also exist non-observable masses. In this approach, to arrive at the observational data, it must be assumed that 95% of the mass on the cosmological level is formed by hypothetical "dark matter" and "dark energy," which are not directly observable.

Later on, Brans and Dicke [1], in their alternative theory of gravity, argued that instead of introducing such hypothetical types of matter, it is more reasonable to conclude that the parameter G describing the local strength of gravitational interactions may be taken as a local constant instead of a universal constant; hence, measurements of G at different points in space–time can lead, in general, to different results. In effect, they assumed a variable $\phi(x)$ instead of $1/G$, measured at different space-time points x, which forms a new scalar field. In such a theory, describing the gravitational field requires both the metric field g_{ij} and the scalar field ϕ. In terms of this new field, the Einstein term R/G in the Lagrangian takes the form ϕR. To obtain a full description of the scalar-tensor theory, we also need to add the term $\phi_{,i}\phi^{,i}/\phi$ to the Lagrangian, describing the effective energy density of the scalar field. As a result, we arrive at the Lagrangian

$$L_{BDT} = \phi\left(R - \frac{\phi_{,i}\phi^{,i}}{\phi^2}\right) + 16\pi L_{mat}.$$

Varying over g_{ij} and ϕ gives the field equations

$$R_{ij} - \frac{1}{2}g_{ij}R = \frac{8\pi}{\phi}T_{ij} + \frac{\omega}{\phi^2}\left(\phi_{,i}\phi_{,j} - \frac{1}{2}g_{ij}\phi_{,k}\phi^{,k}\right) + \frac{1}{\phi}(\phi_{;ij} - g_{ij}\Box\phi)$$

and

$$\Box\phi = \phi^{,k}_{;k} = \frac{8\pi}{(2\omega+3)}T,$$

where T is the trace T^i_i of the energy momentum tensor.

[1] The article is published in the original.

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Teleparallel loop quantum cosmology in a system of intersecting branes

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ABSTRACT

Recently, some authors have removed the big bang singularity in teleparallel Loop Quantum Cosmology (LQC) and have shown that the universe may undergo a number of oscillations. We investigate the origin of this type of teleparallel theory in a system of intersecting branes in M-theory in which the angle between them changes with time. This system is constructed by two intersecting anti-D8-branes, one compactified D4-brane and a D3-brane. These branes are built by joining M0-branes which develop in decaying fundamental strings. The compactified D4-brane is located between two intersecting anti-D8 branes and glues to one of them. Our universe is located on the D3 brane which wraps around the D4 brane from one end and sticks to one of the anti-D8 branes from the other one. In this system, there are three types of fields, corresponding to compactified D4 branes, intersecting branes and D3-branes. These fields interact with each other and make the angle between branes oscillate. By decreasing this angle, the intersecting anti-D8 branes approach each other, the D4 brane rolls, the D3 brane wraps around the D4 brane, and the universe contracts. By separating the intersecting branes and increasing the angle, the D4 brane rolls in the opposite direction, the D3 brane separates from it and the expansion branch begins. Also, the interaction between branes in this system gives us the exact form of the relevant Lagrangian for teleparallel LQC.

1. Introduction

Until now, many scientists have tried to propose a model which removes the big bang and predicts phenomenological events. One of the best theories which prevents this singularity by introducing a modification in Friedmann's equation is Loop Quantum Cosmology (LQC). The holonomy corrections in the flat Friedmann–Lemaître–Robertson–Walker (FLRW) geometry can be added to the classical Hamiltonian by replacing the Ashtekar connection c on γd, where γ is the Barbero–Immirzi parameter, by the function $\frac{\sin(\bar{\mu}c)}{\bar{\mu}}$, where $\bar{\mu} = \frac{\lambda\sqrt{\Delta}}{p}$ (see for instance [1]). Then, with the help of this new holonomy corrected Hamiltonian, one derives the modified Friedman equation (an ellipse in the plane (H, ρ), where H is the Hubble parameter and ρ the energy density of the universe) [2]. The same holonomy corrected Friedmann equation can be provided in the context of teleparallel gravity, considering a $F(T)$-Lagrangian density – named as teleparallel LQC – where in the flat FLRW spacetime the scalar torsion is given by $T = -6H^2$ [3]. From the viewpoint of teleparallel LQC, the universe evolves from the contracting phase to the expanding one passing through a non-singular bounce [4]. Moreover, this theory mixes the simple bounce obtained by holonomy corrections in LQC with the non-singular perturbation equations given by $F(T)$ gravity and derives a non-singular bounce scenario as a viable alternative to the inflationary paradigm [5,6]. In parallel, there are some models in string theory which replace the big bang singularity by the fundamental string and predict that the age of the universe is infinity [7–14]. In these models, firstly, N fundamental strings are excited and decay to N pairs of D0-anti-D0-branes in string theory or M0-anti-M0-branes in M-theory. Then, these branes stick to each

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Journal of Radiotherapy in Practice

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Original Article

Left-sided breast radiotherapy after conservative surgery: comparison of techniques between volumetric modulated arc therapy, forward-planning intensity-modulated radiotherapy and conventional technique

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(Received 21 July 2016; revised 19 September 2016; accepted 10 October 2016)

Abstract

Objective: This study was conducted for comparison of techniques between volumetric modulated arc therapy (VMAT), forward-planning intensity-modulated radiotherapy (FIMRT) and conventional technique for left-sided breast radiotherapy after conservative surgery.

Methods: In all, 20 postoperative left breast carcinoma patients were included in this study. In all plans the planning target volume (PTV) was the breast tissue with appropriate margin as per our institutional protocol. The contouring was done on a Monaco Sim (V5.00.02) contouring workstation. All patient were planned using partial arc VMAT in Monaco treatment planning system (TPS) (V5.00.02) and treated on Elekta Synergy linear accelerator. The 3D conformal radiotherapy (3DCRT) and FIMRT planning were done in CMS XiO (V5.00.01.1) TPS. The 3DCRT planning consisted of conventional medial and tangential wedge portals with multileaf collimator field shaping conforming to the target volume. For all the plans generated the following metrics were scored: V105%, V100%, V95%, mean dose (for PTV), V5%, V20%, D2cc and mean dose (for organs at risk).

Results: The mean PTV volume for 20 patients was 1,074·6 ± 405·1 cc. The highest PTV dose coverage was observed in the 3DCRT technique with 94·1 ± 1·8% of the breast PTV receiving 95% of the prescription dose (V95%). However, it was also observed that this technique resulted in 21·3 ± 10% of the PTV receiving more than 105% of the prescription dose (V105%), which was highest among the three techniques. In contrast, VMAT yielded lowest V95% of 93·0 ± 1·8 and 3·3 ± 5·5% of V105%.

Conclusion: This study concluded equivalent result between FIMRT and VMAT. However, VMAT was found to be the choice of radiotherapy technique as it produces lesser dose distribution to heart compared with any other technique.

Keywords: 3DCRT; FIMRT; left-sided breast radiotherapy; volumetric modulated arc therapy (VMAT)

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Dark Energy Models in $f(R,T)$ Theory with Variable Deceleration Parameter

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Received: 2 March 2015 / Accepted: 10 August 2015

Abstract In this communication we have investigated Bianchi type-II dark energy (DE) cosmological models with and without presence of magnetic field in modified $f(R,T)$ gravity theory as proposed by Harko et al. (Phys. Rev. D, **84**, 024020, 2011). The exact solution of the field equations is obtained by setting the deceleration parameter q as a time function along with suitable assumption the scale factor $a(t) = [sinh(\alpha t)]^{\frac{1}{n}}$, α and n are positive constant. We have obtained a class of accelerating and decelerating DE cosmological models for different values of n and α. The present study believes that the mysterious dark energy is the main responsible force for accelerating expansion of the universe. For our constructed models the DE candidates cosmological constant (Λ) and the EoS parameter (ω) both are found to be time varying quantities. The cosmological constant Λ is very large at early time and approaches to a small positive value at late time whereas the EoS parameters is found small negative at present time. Physical and kinematical properties of the models are discussed with the help of pictorial representations of the parameters. We have observed that our constructed models are compatible with recent cosmological observations.

Keywords Bianchi type-II space-time · $f(R,T)$ gravity theory · Dark energy · Variable deceleration parameter · EoS parameter

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ORIGINAL ARTICLE

Anisotropic string cosmological models in Heckmann-Schucking space-time

G.K. Goswami[1] · R.N. Dewangan[1] · A.K. Yadav[2] · A. Pradhan[3]

Received: 25 October 2015 / Accepted: 4 December 2015

Abstract In the present work we have searched the existence of the late time acceleration of the universe with string fluid as source of matter in anisotropic Heckmann-Schucking space-time by using 287 high red shift ($0.3 \leq z \leq 1.4$) SN Ia data of observed absolute magnitude along with their possible error from Union 2.1 compilation. It is found that the best fit values for $(\Omega_m)_0$, $(\Omega_\Lambda)_0$, $(\Omega_\sigma)_0$ and $(q)_0$ are 0.2820, 0.7177, 0.0002 & −0.5793 respectively. Several physical aspects and geometrical properties of the model are discussed in detail.

Keywords String · SN Ia data · Heckmann-Schucking space-time

1 Introduction

The SN Ia observations (Riess et al. 1998; Perlmutter et al. 1999) suggest that the observable universe is undergoing an accelerated expansion. This remarkable discovery stands a major break through of the observational cosmology and indicates the presence of unknown fluid—dark energy (DE) that opposes the self attraction of the matter. This acceleration is realized with positive energy density and negative pressure. So, it violates the strong energy condition (SEC). Astier et al. (2006) confirmed that the violation of SEC gives a reverse gravitational effect that provides an elegant description of transition of universe from deceleration to cosmic acceleration. The cosmological constant cold dark matter (ΛCDM) cosmological model is the simplest model of universe that describes the present acceleration of universe and fits with the present day cosmological data (Grøn and Hervik 2007). It is based on the Einstein's theory of general relativity with a spatially flat, isotropic and homogeneous space-time. The observed acceleration of universe has been explained by introducing a positive cosmological constant Λ which is mathematically equivalent to vacuum energy with equation of state (EOS) parameter set equal to −1. It suffers from two problems on theoretical front, concerning the cosmological constant (Λ). These problems are known as fine tunning and cosmic coincidence problems (Carroll et al. 1992; Copeland et al. 2006). In the contemporary cosmology, the source that derives the present acceleration of universe is still mystery and is discussed under the generic name DE. In the literature, the simplest candidate of dark energy is a positive Λ besides some scalar field DE models, namely the phantom, quintessence and k-essence (Copeland et al. 2006; Alam et al. 2003). In the physical cosmology, the dynamical form of DE with an effective equation of state (EOS), $\omega < -\frac{1}{3}$, were proposed instead of constant vacuum energy. The current cosmological data from large scale-structure (Komastu et al. 2009), Supernovae Legacy survey, Gold Sample of Hubble Space Telescope (Riess et al. 2004; Astier et al. 2006) do not support the possibility of $\omega \ll -1$. However, $\omega = -1$ is a favor-

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ORIGINAL ARTICLE

FRW cosmological models in Brans-Dicke theory of gravity with variable q and dynamical Λ-term

Avtar Chand[1] · R.K. Mishra[1] · Anirudh Pradhan[2]

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Abstract Exact solution of modified Einstein's field equations are considered within the scope of spatially homogeneous and isotropic Friedmann-Robertson-Walker (FRW) space-time filled with perfect fluid in the frame work of Brans-Dicke scalar-tensor theory of gravity. In this paper we have investigated the flat, open and closed FRW models and the effect of dynamic cosmological term on the evolution of the universe. Two types of FRW cosmological models are obtained by setting the power law between the scalar field ϕ and the scale factor a and deceleration parameter (DP) q as a time dependent. The concept of time dependent DP with some proper assumptions yield two type of the average scale factors (i) $a(t) = [\sinh(\alpha t)]^{\frac{1}{n}}$ and (ii) $a(t) = [t^{\alpha}e^{t}]^{\frac{1}{n}}$, α and $n \neq 0$ are arbitrary constants. In case (i), for $0 < n \leq 1$, it generates a class of accelerating models while for $n > 1$, the models of the universe exhibit phase transition from early decelerating to present accelerating phase and the transition redshift z_t has been calculated and found to be in good agreement with the results from recent astrophysical observations. In case (ii), for $n \geq 2$ and $\alpha = 1$, we obtain a class of transit models of the universe from early decelerating to present accelerating phase. Taking into consideration the observational data, we conclude that the cosmological constant behaves as a positive decreasing function of time. The physical and geometric properties of the models are also discussed with the help of graphical presentations.

Keywords Brans-Dicke gravity · Cosmological constant · Variable deceleration parameter

1 Introduction

The gravitational constant G, velocity of light c and cosmological constant Λ are all proper constants in Einstein's general theory of relativity. In 1961 Brans and Dicke contributed an interesting alternative to general relativity based on Mach's principle. To understand the reasons leading to their field equations, we first note that the concept of a variable mass. For how do we compare masses at two different points in space time? Masses are measured in certain units, such as masses of elementary particles, which are them self subject to change. We need an independent unit of mass against which an increase or decrease of a particle mass can be measured. Such a unit is provided by gravity, the so called Planck mass. Thus, if we insist on using mass unit that are the same everywhere, a change of dimensionless quantity $\chi = m(\frac{G}{c})^{1/2}$ would tell us that G is changing. This is the conclusion Brans and Dicke arrived at in their approach to Mach's principle. They looked for a framework in which the gravitational constant G arises from the structure of the universe, so that a changing G could be looked upon as the Machian consequences of a changing universe.

These intuitive concepts are contained in the Brans-Dicke action principle, which may be written in the form

$$A = \frac{c^3}{16\pi}\int_R \left(\phi R + \omega\phi^{-1}\phi^k\phi_k\right)\sqrt{-g}d^4x + A. \qquad (1)$$

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ORIGINAL ARTICLE

$F(R)$ bouncing cosmology with future singularity in brane-anti-brane system

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Abstract Recently Odintsov and Oikonomou (Phys. Rev. D 92:024016, 2015b) proposed the origin of a Type IV singular bounce in a modified gravity and found an explicit form of $F(R)$ which can generate this type of bouncing cosmological evolution. In this paper, we construct their model in string theory and show that interaction between branes is the main cause of $F(R)$ bouncing cosmology. In our technique, N fundamental strings decay first to N $M0$-anti-$M0$-brane then, $M0$-branes link to each other, originate and form an $M3$-anti-$M3$ system. Our universe is located on one of these $M3$-branes and interact with the universe on another $M3$-brane via some scalars. The branes in this system wrap around each other and form a compacted system. This process causes to a contraction of universes and produces a contraction branch in a $F(R)$ bouncing model of cosmology. Also, the relevant actions of compacted $M3$-branes include higher order of derivatives which lead to communication relations in generalized uncertainty principle. On the other hand, branes and anti-branes absorb each other, the radius of compactification is reduced, some of scalars gain negative square masses and become tachyons. This system is unstable, broken and branes rebound to non-compact state during an expansion branch. With opening of branes, some other scalars achieve to tachyon phase and consequently, this epoch stops. This process may be repeated in different branches. In this theory, the Type IV singularity occurs at $t = t_s$, which is the time of producing tachyons between two branches. It is observed that the derived model is in good agreement with recent Planck data (Ade et al. in arXiv:1502.02114 [astro-ph.CO], 2015 and in Astron. Astrophys. 571:A22, 2014) and obtain the bouncing point.

Keywords Bouncing cosmology · Future singularity · Branes-antibranes

1 Introduction

One of important fields of physics that can help us investigate the origin of bounce models is the modified gravity. Until now, less discussions have been done on the origin of different bouncing cosmologies in $F(R)$ gravity (Odintsov and Oikonomou 2014, 2015a, 2015b; Odintsov et al. 2015; Bamba et al. 2015; Amoros et al. 2014; Paul et al. 2014; Barragan et al. 2009; Nojiri and Odintsov 2007, 2011). For example, in one paper, it is shown that matter bounce cosmology can be produced by the $F(R)$ gravity which has the function with positive rational numbers powers of the Ricci scalar (R) in the large cosmic time regime and a Gauss hyper-geometric function in the small cosmic time (Odintsov and Oikonomou 2014). In another investigation, it is found that the $F(R)$ gravity responsible for the super-bounce has the form $R + \alpha R^2$ at the

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Indian Journal of CANCER

ORIGINAL ARTICLE
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Do technological advances in linear accelerators improve dosimetric outcomes in stereotaxy? A head-on comparison of seven linear accelerators using volumetric modulated arc therapy-based stereotactic planning

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SU-F-J-126: Influence of Six Dimensional Motions in Frameless Stereotactic Dosimetry Incorporating Rotational Shifts as Equivalent Translational Shifts: A Feasibility Study for Elekta-BrainLAB Stereotactic System

B Sarkar, A Manikandan, K Jassal, T Ganesh, A Munshi, B Mohanti, A Pradhan

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https://doi.org/10.1118/1.4956034
Citations: 3

About

Abstract

Purpose:

Six dimensional positional shifts (translational and rotational) determined by a volumetric imaging system were mathematically combined and incorporated as simple translational shifts and the resultant impact on dose characteristics was studied.

Methods:

Thirty patients who underwent either single fraction (12 Gy) or five fractions (5 Gy per fraction) stereotactic treatments were included in this study. They were immobilized using a double layered thermoplastic mask from BrainLAB. Isocenter matching was done using infrared marker of ExacTrac. An initial cone beam CT (CBCT) gave positional shifts in 6-dimensions that were applied through 6-D motion enabled couch. A verification CBCT was done following corrections before treatment. These 6-D positional shifts determined at each imaging session from the first CBCT were mathematically combined to give three simple translational shifts. Doses were recalculated in the patient matrix with these positional errors present by moving the whole image dataset. Doses were also recalculated after second CBCT with only residual errors present. PTV dose statistics were compared.

Results:

For the approved plans V100%(PTV), V100%(GTV), D95%(PTV), D95%(GTV), D1%(PTV) and D1%(GTV) were 96.2±3.0%, 98.2±1.4%, 102%±1.7%, 103±1.2%, 107.9±8.9% and 109.3±7.5% of prescription dose respectively. With the positional errors present (after 1st CBCT) the corresponding values were 86.7±4.9%, 91.3±2.9%, 89.6±4.2%, 95.9±3.7%, 108.3±9.9% and 108.6±4.5%. Post-correction (after 2nd CBCT) with only residual errors present, values were 94.5±5.7%, 97.3±2.9%, 99.3%±3.2%, 102%±2.1%, 107.6±8.5% and 109.0±7.6% respectively. Significant and nominal OAR dose variation was observed between pre- and post-table corrections.

Conclusion:

Positional errors significantly affect PTV dose statistics. They need to be corrected before delivery of stereotactic treatments although the magnitude of dose changes can vary from patient-to-patient depending on the tumor location. As expected after the table corrections, residual errors result in insignificant dose deviations. For frameless stereotactic treatments having a six-dimensional motion enabled couch is highly recommended to reduce quantum of dose deviations.

changes are observed in terms of mean dose to parotids or maximum dose to mandible, while oral mucosa and thyroid result better spared with TAV techniques. Though smallest for IMRT, the mean HTID is not significantly different from the TAV techniques. Finally, MU's for all TAV techniques are significantly lower than for IMRT; no reduction is observed when using one partial arc instead of 3 full arcs.

[illegible]

		Objective	IMRT	3F	2FP0	2FP90	Wilcoxon test (p<0.05)
PTV70	D_{50}	≥100%	100%	100%	100%	100%	–
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	d
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	none
	CI	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	d
	HI	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	none
PTV63	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
PTV56	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	none
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	d
Spinal cord PRV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Brainstem PRV	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	none
Cx parotid?	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	none
Ix parotid?	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	none
Larynx	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Oral Mucosa	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Mandible	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	none
Vertebrae?	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	d
Thyroid	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Healthy tissue	[illegible]	–	[illegible]	[illegible]	[illegible]	[illegible]	none
	MU	–	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

[illegible]

Conclusion: TAV techniques allow same PTV coverage and OAR sparing as 7-field IMRT, with one third of MU's and better dose homogeneity. HTID results lowest in IMRT, but differences are not significant. As for the optimal TAV configuration, 2FP90 including one partial arc with a 90° collimator angle seems to spare spinal cord and brainstem significantly better than 3F or 2FP0 techniques.

EP-1685

Influence of flat, flattening filter free beam model and different MLC's on VMAT based SRS/SRT

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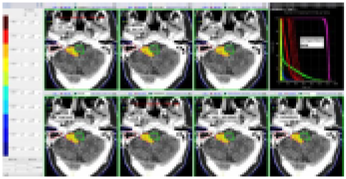
Purpose or Objective: Linear accelerator (Linac) based stereotactic radiotherapy (SRT) and stereotactic radiosurgery (SRS) using Volumetric modulated arc therapy (VMAT) got a wide spread application for treating intracranial lesions. In recent time linacs were facilitated with flattening filter free beam and miniature MLC's. This development was intended to facilitate a superior dose conformity and quicker therapy delivery.This study was designed to study the dosimetric outcomes and monitor unitsof the stereotactic treatment plans attributed to different commercially available MLC and beam models.

Material and Methods: Ten patients having twelve target volumes, who received the stereotactic treatment in our clinic using Axesse linear accelerator (reference arm), were retrospectively considered for this study. The test arms includes plans using Elekta Agility with FFF, Elekta Agility with flat beam, Elekta APEX, Varian Millennium 120, Varian Millennium 120HD and Elekta Synergy in Monaco treatment planning system. Calculation grid size andplanning constraints were not altered in the test plans. To objectively evaluate the efficacy of MLC-beam model, the resultant dosimetric outcomes were subtracted from the reference arm parameters.

Results: Figure 1 represent total seven (one reference arm and six test arm) plans for an evaluated patient. Maximum dose and mean dose of PTV/GTV V105%, V100%, V95%, D1%, showed a maximum inter MLC- beam model variation of 1.5% and 2% for PTV and GTV respectively. Average PTV heterogeneity index andconformity index shows a variation in the range 1.08-1.11 and0.56-0.63 respectively. Mean dose difference (excluding reference arm) for all organs varied between 1.7cGy -194.5cGy (mean dose 16.1 cGy SD=57.2 cGy) and 1.1cGy-74.8cGy (Mean dose= 6.1 cGy SD=26.9 cGy) for multiple and single fraction respectively.



Conclusion: The dosimetry of VMAT based stereotactic treatment plan yield minimal dependency on beam characteristic (model) and MLC width. All tested MLC and beam model could fulfil the desired PTV coverage respecting OAR dose constraints. The only notable difference was the halving of the MU for FFF beam as compared to plane beam. This has the potential to reduce the total patient on couch time by 15% (approximately 2 minutes).

EP-1686

Frameless radiosurgery in brain metastasis with Tomotherapy: a comparison toward dosimetric index

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Purpose or Objective: Effectiveness of stereotactic radiosurgery (SRS) in treatment of brain metastasis have been demonstrated. In this work we have, retrospectively investigated dosimetric features of frameless SRS delivered with Tomotherapy and compared with reported result in literature in term of Paddick Conformity Index (CI) , Homogeneity Index (HI) and Gradient Score Index (GSI).

Material and Methods: 68 patient treated between 2008 and 2013 in our institution with frame-less set-up (only thermoplastic mask) have been enrolled. 89 Lesions have been stratified for dimension (lower or greater than 5 cc) and for prescription strategies. ICRU 62 (D95>95%, D110<10%) guidelines were utilized for 40 patients while ICRU83 (D50%=Prescription, D98>95%, D107<2%) recommendations were utilized in the remaining 28. Dosimetric index for describing Target Coverage, Target Homogeneity and Organ at Risk (OAR) sparing were selected among the most used in similar studies (Pubmed Line, keyword: "Dosimetric index", "Radiosurgery", "Tomotherapy", "Brain").

Results: CI, HI and GSI are the most cited feature for describing respectively Target Coverage (21 studies), Target Homogeneity (12 studies) and OARs sparing (5 studies). Mean and standard deviation of CI, HI and GSI in the cohort were, respectively, 1,59 ± 0,38, 1,06 ± 0,04 and 51 ± 16. A multivariate logistic regression analysis of the PTV volume showed significant influence (p<0.05) on CI while prescription strategies influenced GSI. ICRU83 recommendations seems to

In the present paper we have developed a model for determining the thermal expansivity of ionic solids at different pressures and temperatures up to the melting points. This model has been applied to determine values of thermal expansivity of NaCl and MgO for a wide range of pressures. It has been found that at a given temperature, the thermal expansivity decreases with increase in pressure and increases with increase in temperature. The increase in thermal expansivity with temperature calculated along isobars is found to decrease rapidly with increase in pressure. This finding is consistent with the thermodynamic constraint according to which the thermal expansivity must approach to zero for a material in the limit of extreme compression ($V \rightarrow 0$).

Keywords: High Pressures; High Temperatures; MgO; NaCl; Thermal Expansivity

Document Type: Research Article

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Temperature Dependent Equation of State for Solids

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ABSTRACT

The temperature dependent equation of state (EOS) is developed in the present work to analyze the thermo-elastic properties of solids. The new EOS is formulated by modifying the pressure dependent form of EOS reported recently by the present authors to explain the elastic behavior of nanomaterials. The values of thermal expansion are calculated for NaCl as an example using the newly formulation under varying temperature conditions from 298 K -773K and compared with the available experimental data. An excellent agreement is obtained between the calculated results and the experimental data. The model is extended for the study of bulk modulus and thermal expansion coefficient of NaCl over the temperature range 298 K to 773K. The results so calculated are found in close agreement with the experimental data. Further the model is applied to study the volume compression in NaCl solid over the pressure ranging from 0 to 30 GPa at different isotherms. The calculated values of compression are achieved in excellent agreement with the experimental data. The present model theory is thus applicable to explain the thermo-elastic properties of solids satisfactorily under high temperature and high pressure.

Keywords: Thermal expansion; thermal expansion coefficient; volume compression; equation of state; Bulk modulus.

INTRODUCTION

It is of great importance in geosciences to explain the thermo elastic behavior of minerals, ionic and metallic solids, alloys etc present in deep interior of the earth under high pressure and high temperature conditions. It helps in disclosing the secret facts about the evolution and dynamics of the earth. The structure, stability, atomic and molecular interactions in the material due to different pressure and temperatures modifies the physical properties of the solid materials. Also the physical properties of solids are greatly influenced by its sizes and shapes and inturns effect the geo physical processes[1, 2, 3].

Thermodynamical study of solids under varying temperature and pressure conditions has widespread applications in physics, engineering and material sciences and predicts the mechanical aspects of solid materials under high pressure and high temperature. The equation of state (EOS) is a thermodynamical relation which explains the

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Pressure dependent equation of state for nanomaterials

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In the present paper, it is shown that the equation of state (EOS) [10,11] described earlier on the basis of the Gruneisen theory of thermal expansivity is mathematically and thermodynamically inconsistent. This inconsistency is corrected by Kholiya [12] using the expansion of PV^2 in powers of $\left(1-\frac{V}{V_0}\right)$ up to the quadratic term. However, in the present study this inconsistency is overcome by assuming the pressure variation with respect to change in volume $\left(\Delta V/V\right)$ and thermodynamically consistent EOS is obtained. The formulated EOS has been used for the study of compression behavior of nanomaterials such as SnO_2 (14 nm); α-Fe_2O_3, CuO (24 nm); Ge (49 nm); Ni (20 nm); Ni- filled and Fe- filled MWCNT under pressure. The results achieved using newly formulated are found to be in better agreement with the experimental data as compared to those calculated from previous EOS. The formulated EOS is further tested to verify its validity in extreme compression region and high pressure range using the Stacey Criteria [22,23]. It is found that newly formulated EOS also satisfies the Stacey's criteria.

Keywords: Equation of state, Volume compression, bulk modulus, high pressure, Nanomaterials, Stacey Criteria

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Laser beat frequency heating of a rippled density plasma

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Two collinear laser beams propagating through a rippled density plasma, with their frequency difference close to plasma frequency, resonantly excite a large amplitude plasma wave. The density ripple of suitable wavenumber slows down the plasma wave very significantly, leading to strong electron heating via the Landau damping of the plasma wave. An analytical framework of the process is developed and the electron temperature scaling with plasma density, laser power and laser frequency have been obtained. Its relevance to recent experiments on intense short pulse laser plasma interaction has been discussed. *Published by AIP Publishing.*
[http://dx.doi.org/10.1063/1.4963733]

I. INTRODUCTION

There exists a significant interest in the excitation of collective modes in a plasma by beating two laser beams.[1–5] Excitation of plasma wave is of particular interest as large phase velocity plasma waves are useful for collective acceleration of charged particles to very high energies.[6–10] The lasers of frequencies ω_1 and ω_2 exert a longitudinal ponderomotive force on the plasma electrons that resonantly drives a plasma wave having a phase velocity equal to the group velocity of the lasers when $\omega_1 - \omega_2 \approx \omega_p$, where ω_p is the plasma frequency. To achieve a large phase velocity of the plasma wave, ω_1 and ω_2 are taken much higher than the plasma frequency. For long laser pulses, the electrostatic potential of the plasma wave is much larger than the ponderomotive potential.[11]

In the context of nonlinear wave mixing and harmonic generation, phase matching requires special attention. For this purpose, a static density ripple in the plasma has been found to be very helpful. Parashar and Pandey[12] studied the second harmonic generation in a plasma with a density ripple and found significant efficiency enhancement when the ripple wave number satisfied the phase matching condition. Rax and Fisch[13] studied the harmonic generation in cold plasma, including relativistic effects. In this case, the plasma frequency is replaced by an effective plasma frequency due to relativistic electron mass. Lin *et al.*[14] developed a technique to fabricate the density ripple of the desired wave number in a gas jet by laser machining with a spatial light modulator. Kuo *et al.*[15] reported an order of magnitude enhancement in the third harmonic efficiency. Liu and Tripathi[16] developed an analytical model for the third harmonic generation in a rippled density plasma and explained these experimental results. Kaur *et al.*[17,18] have studied the effect of self-focusing on resonant second harmonic generation of Gaussian beam in collisional magneto-plasma. The beam propagates along the direction of magnetic field in the extraordinary mode and undergoes self-focusing due to Ohmic nonlinearity. The beam causes non-uniform heating of electrons.

In this paper, we develop an analytical formalism of beat frequency heating of a rippled density plasma by two collinear lasers with frequency difference in the terahertz range. The THz ponderomotive force beats with the density ripple$_q$ to produce the nonlinear density perturbation at ω and k where $\omega = \omega_1 - \omega_2$, $\mathrm{k} = \mathrm{q} + \mathrm{k}_1 - \mathrm{k}_2$. The density perturbation derives a space charge field that is strongly Landau damped on electrons when $\omega/\mathrm{k} \sim \mathrm{v_{th}}$ ($\mathrm{v_{th}}$ being the electron thermal velocity), leading to heating of electrons.

In Section II, we deduce the beat frequency electric field produced by two collinear lasers in a rippled density plasma. In Section III, we obtain the anomalous heating rate of electrons. In Section IV, we discuss the results.

II. BEAT FREQUENCY ELECTRIC FIELD

Consider a rippled density plasma of electron temperature $\mathrm{T_e}$ and electron density n_0

$$n_0 = n_0^0 + n_q$$
$$n_q = n_q^0 e^{iqz}, \tag{1}$$

where n_0^0 is the average density, n_q^0 is the ripple amplitude, and q is the ripple wave number. Two collinear lasers propagate through the plasma (Fig. 1) with electric and magnetic fields

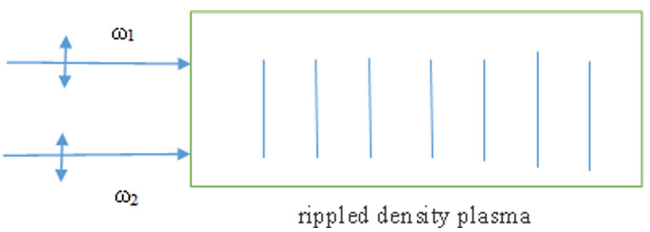

FIG. 1. Schematic of laser beat wave heating of electrons in a rippled density plasma.

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An in-vivo study for targeted delivery of copper-organic complex to breast cancer using chitosan polymer nanoparticles

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Synthesis of carbon nanoparticle embedded graphene for sensitive and selective determination of dopamine and ascorbic acid in biological fluids†

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Design of dual stimuli responsive polymer modified magnetic nanoparticles for targeted anti-cancer drug delivery and enhanced MR imaging†

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Full Paper

Voltammetric Determination of Molecular Modeling Parameters for Pentaazamacrocyclic Complexes of Mn(II) and Co(II)

Anuj Kumar,[1,*] Vinod Kumar Vashistha,[2] Prashant Tevatia[1] and Randhir Singh[1]

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Abstract- In present studies, [$Mn^{II}LCl_2$] and [$Co^{II}LCl_2$] pentaazamacrocyclic complexes (where L=Dichloro-2,3-dimethyl[b]-pyridyl-3,6,9,12,15-pentaazacyclopentadeca-2,12-diene) have been synthesized by template method and characterized by microanalysis, UV-Vis, IR and mass spectral studies. On the basis of electronic spectral studies, the saddle-shape octahedral geometry has been assigned to these pentaazamacrocyclic complexes. Electrochemical studies of HOMO-LUMO energy levels of these pentaazamacrocyclic complexes have been carried out by using cyclic voltammetry. The onset oxidation and reduction potentials of [$Mn^{II}LCl_2$] and [$Co^{II}LCl_2$] macrocyclic complexes were determined under the similar experimental conditions to calculate the ionization potential (Ip) and electron affinity (Ea) for these macrocyclic complexes. The molecular modeling parameters were also calculated from the calculation of HOMO-LUMO energy levels. The obtained values of these parameters are indicating that [$Mn^{II}LCl_2$] macrocyclic complex is more stable than [$Co^{II}LCl_2$] complex. The biological activity of these macrocyclic complexes were also taken into account against *E. coli, B. cereus*, *P. aeruginosa, S. aureus* and *C. albicans* microbial pathogen and compared with the standard drug Gentamycin.

Keywords- Spectroscopy, Cyclic voltammetry, Redox modeling, Antimicrobial

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Mn and As doping of β-$FeSi_2$ *via* a chemical method

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A Study of Ultra-Violet Irradiation on Epithelial Tissue of Fresh Water Fish, "*Puntius Sophore*"

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ABSTRACT

The small indigenous fishes (SIFs) are known to be micronutrient rich. The gene Puntius comprises of about 134 beautiful species, out of which *Puntius Sophore* is an important species. Comprehensive nutrient profile of *Puntius Sophore* showed that it is rich in protein and minerals. In the present study we are investigating the effect of UV irradiation on epithelial tissue of fish, *Puntius Sophore*. The quantities of various mineral constituents, fat and amino acids were analyzed at different time intervals. This study was undertaken to evaluate the mineral and organic chemical constituents present in scale of fish, Puntius Sophore. The minerals (Na, Ca, Mg, P, and F), CO_2 and organic constituents (fat, protein and nitrogen) were determined before and after the time intervals of 1 hour, 10 hours and 20 hours of U.V. irradiation. All mineral constituents remain unchanged after U.V. irradiation. Total nitrogen, crude fat and crude protein showed continuous decrease with increase in the time of exposure. Percentage decrease in total nitrogen, crude fat and crude protein after 20 hour exposure was 2.784, 7.79 & 2.88 respectively. Likewise Amino acids content in fish scale decreases, maximum being in case of valine after 20 hours exposure. The reason for this decrease is the C-C bond cleavage with the formation of free radicals and evolution of ammonia. Exposure also reduced the weight of the scale powder.

Keywords: U.V. Irradiation, epithelial tissue, amino acid, crude fat, crude protein, fish *Puntius Sophore*.

INTRODUCTION

Puntius Sophore is one of the nutritionally superior SIFs[11, 16 - 18]. Nutritional composition of fish varies with the variables as zoogeography, size, season etc. The present study was undertaken to investigate the effect of U.V. radiation on essential mineral constituents, fat and amino acids present in scales of *Puntius Sophore*.

Ultraviolet Radiations may be understood as radiation beyond the violet region. Wavelength range of this region is 4000 to 20A^0. Radiations near ultra-violet region corresponding to 2000 Å (frequency 1.51X10^{15} cycles / seconds) have energy equal to 1.43X10^{15} calories and U.V. frequency 1.5X10^{15} cycles/ seconds have energy 1.43X10^7 calories (Bajpai & Mishra, 1990)[5], (Gurdeepraj, 1991)[12] William Kemp (1986)[15]. Ultraviolet light has

A Bakhtinian Analysis of Shashi Tharoor's *Riot*: Heteroglossia, Polyphony and the Carnivalesque in the Novel

Yogeshwar Dwivedi*

Whether literature is a whole mirror reflecting the reality or a "broken mirror" refracting reality; whether the author is dead in a literary text or is communicating personal experiences or those of others but it is certain that a fictional text is a product of contemporary socio-economic, historical-political and cultural reality structured in a well thought-out pattern in which characters are shown undergoing different experiences in situations grappling with themselves or the surroundings. The text is presented before the reader to feel and interpret the experiences of the characters, situations and the issues taken up by the writer and fill the gaps wherever there are silences. Shashi Tharoor, a maverick writer with a hawk's eye for detail and newness, has hardly left any untouched subject of discovery and scrutiny in the Indian social and cultural milieus. The very range of his experiences is stunningly refreshing, each experience and each anecdote and every character is delved into and branded by Tharoor with his own inimitable style of writing. Tharoor thrived and blossomed in a very modern India. The life and times may have been situationally turbulent but from his experience Tharoor has successfully painted a Kaleidoscopic mosaic of Indian life – in its richness, its poverty, its backwardness, diversity, cultural specificity of each state especially his beloved state of Kerala and a multilingual babble of languages or tongues.

In his novel *Riot* Shashi Tharoor portrays multiplicity of themes and conflicts – of people, attitudes, philosophies, religions, love, hatred, race and gender issues in a different and new ways and gives it an organic shape in the wake of a love story between Priscilla and Lakshman. An American volunteer Priscilla Hart, who is in Zalilgarh, a small districts in Uttar Pradesh, working with a nongovernmental association Help-us. She is involved in the population control awareness programme. She arrives in India when the country is communally hypersensitive. Her father's job brings her to India when she was fifteen. The only Indians she came across during this period are the servants, the lower class with all its poverty, bazaars, the movies, the temples and the mosques. She works actively for the social services league, reads to blind children, helps at the catholic orphanage and cares for the underside of this society, but during this stay an incident changed her life. One afternoon she finds her father in bed with his secretary Nandani

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Shiva-Narmada Myth in Gita Mehta's *A River Sutra*

Mamta Bhatnagar *
Nitin Bhatnagar **

Myths are an organized collection of stories which reveal important aspects of a culture as well as beliefs of its people. Beneath the story-lines, they usually deal with the major issues such as the origin of mankind and its traditions, and the way in which the natural and human worlds function on a profound universal level. The pantheon of mythic characters is the super-family that every man and woman of a particular culture is born into. Myths came up much before art, language, literature, religion, science or philosophy. A culture's mythology is a powerful tool for understanding psychology of a particular group, casting light on its shared unconscious.

Wendy Doniger O'Flaharty accepts myth as a kind of collective dream expressing unconscious wishes. Wisdom, adventure and romance contained in the Indian mythology are an integral part of every Indian's life today. Through generations, different stories have been passed either by the word of mouth or through carefully stored scriptures. The stories of the scriptures like Ramayana, the Mahabharata and the Puranas are meant to convey great philosophical truths, subtle facts, rules and maxims to guide our daily life and the interpretation depends upon the sublimity of the reader.

In the same line Gita Mehta has very aesthetically woven the Hindu myths in her story that she artistically narrates them in The River Sutra. The principal myths are of the river Narmada and that of Lord Shiva interspersed with some tribal folklore. Indian mythology is one of the richest elements of Indian Culture and also gives agreeable answers to certain unanswerable questions. The present paper, firstly, is an effort to study Gita Mehta's use of 'Shiva-Narmada Myth in A River Sutra' to explore its symbolic significance in the context of the contemporary society and secondly, to study their role in affecting the traditional avenues of the Indian culture.

Key Words: Myth, culture, collective dream, scriptures,

Myths are an organized collection of stories which reveal important aspects of a culture as well as beliefs of its people. Beneath the story-lines, they usually deal with the major issues such as the origin of mankind and its traditions, and the way in which the natural and human worlds function on a profound universal level. The pantheon of mythic characters is the super-family that every man and woman of a particular culture is born into.

W. K. Wimsatt states:

> Giambattista Vico, the Neapolitan scholar had elaborated the theory that myth was a kind of poetic language, the only language the man was capable of in his primitive stage of development..... Vico conjectured that the language first began with gesture, then developed through the stages of myth and figurative language to the clarified and ordered language of modern polite societies. (699-700)

Myths came up much before art, language, literature, religion, science or philosophy. A culture's mythology is a powerful tool for understanding psychology of a particular group, casting light on its shared unconscious.

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PROFILE OF TOURIST VISITING TAJMAHAL IN AGRA

-Dr. Divya Gupta

ABSTRACT

The state of Uttar Pradesh is ranked second in terms of domestic tourist arrivals while in terms of foreign tourist arrivals; it is ranked at number four. Agra city is well known for its three World Heritage sites namely, TajMahal, Agra Fort and Fatehpur Sikri. Besides these memorable Heritage sites Agra also has many other lesser known sites which have tremendous potential to be included in the tourist list.

Many Historians and travelers consider Agra to be the most suitable venue for their insatiable hunt for buildings of the past as it is full of old monuments spread throughout the city specially on the riverbank. TajMahal is the mausoleum built by ShahJahan in the memory of his beloved wife Mumtaj Mahal. Agra Fort is around 2.5 km northwest from TajMahal. It is also considered as a walled palatial city. Fatehpur Sikri is world famous 16th century capital city built by Akbar.

1. INVOLVEMENT IN THE SURVEY

This author acted as supervisor in a survey of TajMahal, Agra Fort and Itimad- ud –Daula's Tomb. A team of nine members participated in the month of March this year while estimating the visitors' inflow in TajMahal from each gate (east, south, and west). This author personally interviewed each and every visitor continuously for four days. She also met certain officials like ADA, Conservation Gr. 1, Uttar Pradesh Regional Head, Agra Fort's C.A., several tourist guides, tour operators, drivers, Hotel and restaurant owners etc for collecting information on various aspects of the present study.

2. OBSERVATIONS AND STUDIES

This author along with Christine made a survey in Tajganj within the 500 meters green zone. We observed the trend of visitors; tour Guides, hotels, restaurants, tour operators etc. On the basis of study we found the total number of visitors including children below 15 years were 3,700 on first day, and 4,600 on second day. Country wise data of foreign tourist arrival in Agra during the years 2010, 2011 and 2012 based on Taj Mahal entry tickets. U.S.A. stood first in top five ranking.

2010 : USA > UK > FRANCE > GERMANY > JAPAN

2011 : USA > JAPAN > UK > GERMANY > FRANCE

2012 : USA > UK > GERMANY > JAPAN > CHINA

A Demonstration of the Discourse Dissection Model (DDM) with an analysis of FD Roosevelt's "Pearl Harbour address to the nation"

Braj Mohan

This paper demonstrates the Discourse Dissection Model (DDM) with an analysis of FD Roosevelt's "Pearl Harbour Address to the Nation". Most of the available models of speech analysis seem to be inadequate because they give no importance to paralinguistic factors and make no difference between spoken discourse and written discourse. As a slight change in pitch, intensity or pause changes the meaning of an utterance significantly, a good model of analysis of spoken discourse should consider the paralinguistic factors. The DDM takes into consideration both the linguistic and the paralinguistic factors to study the meaning and emotional and persuasive effects of spoken discourse. In this paper, the use of persuasive strategies in Roosevelt's "Pearl Harbour Address to the Nation" has been studied with the help of DDM.

Keywords: *speech analysis, rhetoric, discourse analysis, genre analysis, public speech, political discourse, speech delivery style, discourse dissection model, DDM*

1. Introduction

Political public speech has been an area of interest among critical discourse analysts, social psychologists, political scientists and rhetoricians. They investigate the contexts and the contents of political speeches to understand and expose how political orators create ideologies and exercise power by persuading the audience. They study what has been said and how it has been said and to what effect. However, their approaches of study are different. They seem to be satisfied with the analysis of the context and linguistic content of the speech without considering the paralinguistic factors that add meaning to the linguistic content. The purpose of this paper is to demonstrate the Discourse Dissection Model (DDM) that relates the linguistic to the paralinguistic. In this demonstration, FD Roosevelt's "Pearl Harbour Address to the Nation" has been analyzed to study how various linguistic and paralinguistic persuasive strategies have been used for discursive construction of persuasive discourse in this speech.

Political oratory is essentially persuasive in nature as the political orators try to affect public opinions for their benefit. They construct, reinforce and uphold political ideologies by using various persuasive strategies. Persuasion has been defined as "a conscious attempt by one individual to change the attitudes, beliefs or behavior of another individual or group of individuals through the transmission of some message" (Bettinghaus & Cody 1987: 3). Perloff defines persuasion as "a symbolic process in which communicators try to convince other people to change their attitudes or behavior regarding an issue through the transmission of a message in an atmosphere of free choice" (Perloff 2003: 8). The political orators use various rhetorical devices and persuasive strategies for influencing audience's perception of a certain issue in order to win their support or to motivate them to do some action. These persuasive strategies are linguistic as well as paralinguistic.

Now let us understand what political discourse is, and how a political public speech is different from other genres of political discourse. Political discourse is a class of genres defined by a social domain, namely, politics (van Dijk 2001: 5). It comprises various genres of written and spoken discourse, such as, parliamentary debates, political interviews, public

Pinak Sankar Bhattacharya

The Aesthetics of Coexistence: Reading the *Mahabharata* in Karnard's *The Fire and the Rain*

The *Vana Parva* of the *Mahabharata* comprises of multiple tales with a gradual development in Yuddhisthira's persona. Due to this Buddhadeva Bose in his *The Book of Yudhishthir* has recognized the forests as 'An Institution of Higher Learning'. One such tale is told by Lomasha is about mutual hatred brewing between the families of Bharadwaja and Raivya'. The characters such as, Bharadwaja, his son Yavakri, Raivya, Raivya's two sons: Paravasu and Arvavasu and even Paravasu's wife are affected at different points of time by moral treachery, seduction, suicide, curse, murder, countless deaths et al. This tale implies the omnipresence of a microcosmic reality in a macrocosmic one.

Girish Karnad, came to be acquainted with this story of Raivya and Bharadwaja in his college days from C. Rajagopalachari's abridgement of the *Mahabharata* and got attracted to it which led to the birth of his *The Fire and the Rain* in 1994-95. Rather than adhering to the story and following it scrupulously, Karnad modifies it to the contemporary social matrix and brings out the blazing problems and the probable solutions. Even the ending of the story has been modified and totally changed by Karnad in his play. Apart from the main characters of this story, Karnad has added another angle by introducing a tribal girl Nittilai, Arvasu's beloved. The subject of the drama has at times digressed from the main narrative. For example, the enactment of the story of Vritra and lord Indra at the place of the sacrifice can be cited in this respect. Karnad has very consciously welded the Great tradition (the story of the *Mahabharata*) with the Little, as is seen through the inclusion of the tribal character, or even introducing a play within a play instead of portraying the *yajna*, and advocating the best version of a multicultural society through this amalgamation. Even the selection of the title is worth mentioning in this regard. Basically, *The Fire and the Rain* is the translation of Karnad's Kannada play, *Agni Mattu Male*. Here *Agni* is a Sanskrit word which describes the ceremonial status of fire and not the Kannada translation *'Benki'* of the word 'fire'. Again, the Kannada word *'Male'* now simply takes up the local meaning 'rain' while distancing itself from the Sanskrit grandeurs. *'Mattu'* means 'and'. Therefore, when the title of the play is intricately studied, then one can reflect the presence of the grave resonating Sanskrit word along with its plebeian counterpart. Karnad states: "Thus the phrase, Agni Mattu

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REVIEW ARTICLE

Trends and advances in the diagnosis and control of paratuberculosis in domestic livestock

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ABSTRACT

Paratuberculosis (pTB) is a chronic granulomatous enteritis caused by *Mycobacterium avium* subsp. *paratuberculosis* (MAP) in a wide variety of domestic and wild animals. Control of pTB is difficult due to the lack of sensitive, efficacious and cost-effective diagnostics and marker vaccines. Microscopy, culture, and PCR have been used for the screening of MAP infection in animals for quite a long time. Besides, giving variable sensitivity and specificity, these tests have not been considered ideal for large-scale screening of domestic livestock. Serological tests like ELISA easily detects anti-MAP antibodies. However, it cannot differentiate between the vaccinated and infected animals. Nanotechnology-based diagnostic tests are underway to improve the sensitivity and specificity. Newer generation diagnostic tests based on recombinant MAP secretory proteins would open new paradigm for the differentiation between infected and vaccinated animals and for early detection of the infection. Due to higher seroreactivity of secretory proteins vis-à-vis cellular proteins, the secretory proteins may be used as marker vaccine, which may aid in the control of pTB infection in animals. Secretory proteins can be potentially used to develop future diagnostics, surveillance and monitoring of the disease progression in animals and the marker vaccine for the control and eradication of pTB.

ARTICLE HISTORY
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KEYWORDS
Cattle; paratuberculosis; Johne's disease; *Mycobacterium avium* subsp. *paratuberculosis*; secretory proteins; review

1. Introduction

Mycobacterium avium subsp. *paratuberculosis* (MAP) is a slow-growing, obligate intracellular fastidious pathogen, with the ability to survive in a wide range of environmental conditions (Deb & Goswami 2011). MAP infection in animals leads to paratuberculosis (pTB) or Johne's disease (JD) in a wide variety of domestic and wild life species (Table 1) (Haghkhah et al. 2008; Gupta et al. 2012; Sonawane & Tripathi 2013; Vinodhkumar et al. 2013; Singh, Singh, et al. 2014). Increasing evidence suggest the association of MAP with human diseases such as Crohn's disease, diabetes type I, and thyroiditis (Sisto et al. 2010; Singh, Chauhan, et al. 2012; Singh, Thakur, et al. 2014). Live MAP bacilli have been detected in food products such as paneer, milk (both fresh and pasteurized) and milk powder (Table 1).

pTB is a chronic granulomatous enteritis characterized by weight loss, infertility, reduced productivity and producibility, progressive emaciation and untimely death, resulting in huge economic losses to the livestock industries worldwide (Hutchinson 1996; Johnson-Ifearulundu & Kaneene 1997; Ott et al. 1999; Otte & Chilonda 2000; Groenendaal et al. 2002; Groenendaal 2005; Hasonova and Pavlik 2006; Vinodhkumar et al. 2013; Rawat, Chaudhary, Kumar, et al. 2014). Control and eradication of pTB is difficult due to its insidious nature, long incubation period and lack of rapid and accurate diagnostic tests.

Early lesions following pTB infection occur in the wall of the small intestines (Sigurdardóttir et al. 1999) and the draining mesenteric lymph nodes since infection is localized to these sites in the early phase (Saxegaard & Fodstad 1985). As the disease progresses, gross lesions may be observed in the jejunum, ileum, caecum, colon, and in the mesenteric lymph nodes where the organism can be detected. Lesions in the intestines result in protein leak and a protein malabsorption syndrome, ultimately leading to wasting especially muscle tissues (Maroudam et al. 2015). The disease can occur in animals at any age over 1–2 years. However, it is most frequently reported in the 3–5 years of age group in dairy cattle. Within a few weeks following infection, multiplication of MAP begins

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Title:	Immuno-reactivity pattern of secretory proteins of *Mycobacterium avium* subspecies *paratuberculosis* vaccine strain ‘S 5’ with potential for diagnosis of Johne's disease in early infection
Authors:	Gupta, Saurabh (/browse?type=author&value=Gupta%2C+Saurabh) Singh, Shoor Vir (/browse?type=author&value=Singh%2C+Shoor+Vir) Bhatia, A K (/browse?type=author&value=Bhatia%2C+A+K)
Keywords:	Immunoblotting;Indirect ELISA;*Mycobacterium avium* subspecies *paratuberculosis*;Secretory proteins;SDS-PAGE
Issue Date:	Jul-2016
Publisher:	NISCAIR-CSIR, India
Abstract:	Diagnosis of Johne's disease (JD) is hampered by the lack of specific immune-reactive antigens. Therefore, studies should be focused on the search of new candidate antigenic epitopes as 'novel biomarkers' for early diagnosis of JD. Secretory proteins profile of novel biotype (‘S 5’) of 'Indian Bison Type' and their immuno-reactivity was studied in early growth period (4 & 6 wk). Analysis of harvested CF (culture filterate) proteins was done by sodium dodecyl sulfate polyacrylamide gel electrophoresis (SDS-PAGE). Immunoblotting showed strong reactivity of 4 CF proteins (19, 36-38 and 65 kDa). Additional 48 kDa protein was recognized at 6 wk using MAP infected caprine serum. Diagnostic potential of early phase secretory proteins was evaluated using Indirect ELISA test. Results showed slightly lower sensitivity and 100.0% specificity with respect to whole cell sonicated semi-purified protoplasmic antigen (sPPA). Our earlier studies clearly exhibited that there cannot be universally effective diagnostic kits in case of chronic insidious diseases like Johne's disease. Therefore efforts should be to use antigen candidates from locally prevalent strains. By using commercially available universal kits we are unknowingly grossly under reporting the disease prevalence/incidence.
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Title:	Evaluation of new ‘indigenous milk dot-ELISA’ as ‘Field Test’ *vis-à-vis* milk plate-ELISA for the detection of *Mycobacterium avium* sub species *paratuberculosis* infection in lactating domestic livestock
Authors:	Singh, Shoor Vir (/browse?type=author&value=Singh%2C+Shoor+Vir) Stephen, Bjorn John (/browse?type=author&value=Stephen%2C+Bjorn+John) Singh, Manju (/browse?type=author&value=Singh%2C+Manju) Gupta, Saurabh (/browse?type=author&value=Gupta%2C+Saurabh) Chaubey, Kundan Kumar (/browse?type=author&value=Chaubey%2C+Kundan+Kumar) Sahzad (/browse?type=author&value=Sahzad) Jayaraman, Sujata (/browse?type=author&value=Jayaraman%2C+Sujata) Aseri, Gajendra Kumar (/browse?type=author&value=Aseri%2C+Gajendra+Kumar) Sohal, Jagdip Singh (/browse?type=author&value=Sohal%2C+Jagdip+Singh) Bhatia, Ashok Kumar (/browse?type=author&value=Bhatia%2C+Ashok+Kumar) Pachoori, Anjali (/browse?type=author&value=Pachoori%2C+Anjali) Chauhan, Jitendra (/browse?type=author&value=Chauhan%2C+Jitendra) Dhama, Kuldeep (/browse?type=author&value=Dhama%2C+Kuldeep)
Keywords:	Paratuberculosis;Dot-ELISA;Plate-ELISA;Milk;Lactating goats and cattle
Issue Date:	Apr-2016
Publisher:	NISCAIR-CSIR, India
Abstract:	*Mycobacterium avium* subspecies *paratuberculosis* (MAP), the cause of incurable Johne’s disease (JD), is endemic in both domestic livestock and human population of the country. It is the major cause of low per animal productivity and reduced productive life in domestic livestock, wherein buffaloes, goats and sheep go for early slaughter for harvesting meat and cows are left to roam on the roads of cities and towns. In the present study, milk dot-ELISA test was standardized in efforts to develop a ‘field test’ for the detection of MAP infection in lactating animals using milk samples. Results of newly developed ‘milk dot-ELISA’ were compared with well standardized ‘indigenous milk plate-ELISA kit’, with known sensitivity and specificity. Of the 276 milk samples screened, 43 (32.0%) and 51 (35.9%) were positive in plate-ELISA and dot-ELISA (True Positives), for bovine and caprine paratuberculosis, respectively. Sensitivity and specificity of dot-ELISA *vis-à-vis* plate-ELISA was 86.2 and 73.8%, respectively. Newly standardized dot-ELISA was found to be highly sensitive, cost effective, quick, repeatable and efficient ‘field test’ for the screening of milk samples of lactating cattle, buffaloes, sheep and goats against MAP infection.
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Comparative study on effect of different embryo culture media on *in vitro* blastocyst production in goats*

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ABSTRACT

The present study was aimed to assess the efficacy of different culture media for blastocyst development. Oocytes (2,539) from 1,059 ovaries recovered by follicle puncture technique were utilized for present investigation. In experiment 1, effect of different embryo culture media (Gr. 1; mKSOMaa; Gr. 2; TCM-199+OEC; Gr. 3; mSOFaa and Gr. 4; mCR2aa) and in experiment 2, effect of sequential embryo culture medium, Gr. 1: mKSOMaa containing 5% FBS (1–3 days) and 10% FBS (4–10 days); Gr. 2: 0.8% BSA (1–3 days) and continuous embryo culture medium, 10% FBS (4–10 days); Gr. 3: 0.8% BSA (1–10 days) and Gr. 4: 10% FBS (1–10 days) on *in vitro* blastocyst development potential was evaluated. Significant higher ($P<0.05$) blastocyst production rate was observed in TCM–199 co-culture with OEC and mKSOMaa medium compared to mSOFaa embryo culture medium. Similarly, significantly higher morula production rate was observed in mKSOMaa medium compared to mSOFaa and mCR2aa medium. However, numerically higher number of embryos cleaved in mSOFaa medium compared to TCM-199 co-culture with OEC. Results indicated that embryos cultured in mKSOMaa, TCM-199+OEC and mCR2aa embryo development media are equally effective in supporting pre-implantation development.While considering the risk factor associated with OEC co-culture, mKSOMaa is proved to be efficient medium for obtaining higher *in vitro* embryo development rate. In experiment 2, significantly higher morula and blastocyst formation was observed in sequential embryo culture medium compared to BSA supplemented continuous embryo culture medium. Further, the present findings indicated that the use of mKSOMaa+0.8% BSA or 5% FBS for first 3 days of embryo culture resulted in increased rate of blastocyst stage embryos, if initial 3 days of culture in mKSOMaa+0.8% BSA was followed by culture in mKSOMaa containing 10% FBS. However, no significant difference was observed in sequential embryo culture medium and continuous embryo culture medium supplemented with 10% FBS.

Key words: Blastocyst, Caprine, Culture media, *in vitro* fertilization, Sequential media

The *in vitro* embryo production (IVEP) has emerged as an alternative to the *in vivo* embryo production due to inconsistent super ovulatory response. Maintaining embryo viability during *in vitro* culture is a key to the application of IVEP. During *in vitro* embryo production, the culture system may deeply influence embryonic development of pre-implantation stage embryos (Cognie *et al.* 2003, Lonergan *et al.* 1999, Yadav *et al.* 2013). Major developmentally important events take place during development of embryos from post fertilization to the blastocyst stage (Kharche *et al.* 2011a). Pre-implantation stage embryos can be developed in different media comprising simple balanced salt solutions and carbohydrates to complex constituents, such as tissue culture medium (TCM-199) with further supplementation of serum, somatic cells and/or a feeder layer of somatic cells (Krisher *et al.* 1999, Summers and Biggers 2003). Further embryo-somatic cell co-culture is aimed at improving the development and viability of mammalian preimplantation embryos generated and cultured *in vitro*. Scanty information is available about the mechanisms underlying the beneficial effects of co-culture, although the production of embryotrophic compounds, modulation of nutrient profile, protection against culture-induced stress and/or toxin clearance are all contenders (Orsi and Reischl 2007). Although the use of media without co-culture is recommended for embryo culture to understand fully the requirements for embryo development, which are essential to know the precise composition of medium in which embryos are grown. It also negates the possible effects of unknown components, minimizes risk of contamination with pathogens and their metabolites, reduces undesirable variations among different lots of culture by eliminating the use of co-culture system. Use of sequential embryo culture media has also been established by various

*Part of Ph.D. thesis.

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9-Title: Comparative evaluation of two screening tests (serum elisa and fecal microscopy) for the estimation of Johne's disease infection in goat herds endemically infected with Johne's disease

Authors: Sahzad, Saurabh Gupta, Kundan Kumar Chaubey, Sujatha Jayaraman, Manju Singh, Bjorn John Stephan, Deen dayal, Mukta Jain, Anjali Pachoori, Jagdip Singh Sohal, Ashok Kumar Bhatia and Shoor Vir Singh

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Abstract

Present study evaluated two screening tests (serum ELISA and fecal microscopy) to estimate bio-incidence of Johne's disease in Barbari, Jakhrana and Jamunapari breeds of goatherds naturally infected and endemic for Johne's disease. A total of 54 fecal and serum samples were tested by microscopy and Indigenous ELISA. Of the 54 serum samples screened, 34 (64.9%) positive for MAP infection in indigenous ELISA, whereas 31 (57.4%) goats were shedding MAP bacilli in feces. Two test combinations (ELISA and microscopy) detected 87.0% goats as positive. Independently, 24.0 and 29.6% goats were missed by indigenous ELISA and microscopy, respectively, By indigenous ELISA higher (72.0%) number of males, were positive as compared to females (55.1%). Correlation between two tests was statistically not significant (p value=0.710) and strength of agreement was poor (Kappa value =0.195). Indigenous ELISA was more sensitive as compared to microscopy and detected a higher number of goats infected with MAP even though anti-MAP antibodies were in lower level. The Study concluded that it is prudent to use a minimum of two tests (indigenous ELISA focusing on immune response and fecal microscopy on bacillary shedding), for the screening of Johne's disease. However, independently indigenous ELISA using native antigen (polyclonal) should be preferred over microscopy for the detection of MAP infection in goatherds

Corpus ID: 212545004

Immunomodulatory activity of Hot Aqueous Extract of Anthocephalus cadamba Leaves in Albino rats

V. Khandelwal, A. K. Bhatia, A. Goel • Published 2017

Present work has been designed to investigate immunomodulatory efficacy of hot aqueous extract (HAE) of Anthocephalus cadamba leaves. To study the effect of HAE of Anthocephalus cadamba leaves over cell mediated immunity of wistar albino rats, hypersensitivity (Type IV) model was being used using 1-chloro, 2, 4-dinitro chloro benzene (DNCB) as an allergen. Experimental animals were divided into four groups as control (group I), group II, group III and group IV. Measurement of skin thickness was... Expand

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Advances in Bioresearch

ORIGINAL ARTICLE

Efficacy of Aqueous Extract of *Solanum xanthocarpum* on Hematological and Biochemical Parameters of wistar albino rat

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ABSTRACT
This work has been performed to study the efficacy of hot whole plant aqueous extract of Solanum xanthocarpum Schrad and Wendl on hematological and Biochemical parameters of wistar albino rats.Doses hot aqueous extract of different concentration like 125 mg/kg, 250 mg/kg, 500 mg/kg and 1000 mg/kg body weight was given orally to different group of rats. As the result of dose administration level of hemoglobin , Packed cell volume (PCV), RBCs decreased and WBCs significantaly (p<.05) increased .On the other hand efficacy of dose on Biochmemical parameter show the mixed effect , the level of urea, creatinin ,albumin, and bilirubin as comparison with control wistar albino rat were not significantly differ while level of Glucose, total cholesterol, Alanin amono transferas (ALT) and Aspartate amino transferase (AST) significantly (p<.05 and .01) decreased .
Key words: Hematological, Biochemical, Solanum xanthocarpum (SX)

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INTRODUCTION

Solanum xanthocarpum Schrad and Wendl family solanaceae commonly known as the Indian night shade or yellow berried night shade(English) and Kantkari (Sanskrit). It is spiney diffuse green perennial herb. *Solanum xanthocarpum* used in this study has profound use in Ayurveda as folkore medicine[1],Solasonine is present in its different parts due to this SX show the pharmacological and medicinal value[2]extract prepared from different parts of SX contain vit C, anthocyanin and solasonin[3]. SX extract show the antibacterial[4], antifungal[5],Hypoglycemic[6], antifilariasis[7] and antioxidant[8] activity.Hematological parameters such as total WBC, RBC,hemoglobin and neutrophil are important constitute of immune system. An alteration in the concentration of these cells profoundly affects the health and immune system as they are known to recognize the foreign antigen and mount immune response [9].Present work was done to estabilish the correlation between the hematological and biochemical parameter with different pharmacological activity[10].

MATERIAL AND METHODS

SX plant was collected from the month of Jan to feb from Mathura(India) and adjoining areas and was identified and authenticated by Dr. A. K. agrawal Head dept. of microbiology BSA college Mathura. The plants was dried in shade and coarsely powdered. Powdered SX 200 gram used for hot aqueous extraction by soxlet apparatus at 100^0C for 8-10 hrs. The extracted solution was dried in rotator evaporator that result in dark tan coloured crystals, percentage yields was 24% w/v.

Wistar albino rats male and female weighing 60-100 gm were collected from central animal house, GLA University, Mathura with GLAIPR/CPCSEA/IAEC/2014/Biotech02. Five groups of rat were made with six rats in each group. Safe dose were determined according to Organization for Economic Co-operation and

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REVIEW ARTICLE

Bioremediation: An Eco-friendly Approach for Treating Pesticides

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ABSTRACT
With the increase in environmental pollution in today's life, new techniques need to be evolved for its treatment too. In this regard we try to rely much on sustainable ways to treat the pollution. Bioremediation is one such promising technique in which microorganisms are used for the treatment of environmental pollutants and can be defined as biological response to environmental abuse. It is also related with the biological regeneration of the previously polluted sites and with the cleaning of areas that have been polluted recently, as a result of production, storage, transport and use of chemicals. Among these chemicals pesticides are very crucial as their use has widely increased to protect the crops from reduction in yield and quality. Also the pesticides have become an important part of modern agriculture. But continuous application of pesticides leads to degradation of the atmosphere. Pesticides have become a major contaminant of air, water, soil and vegetables. Moreover, these can easily pass into living tissues resulting in Bioaccumulation. Thus, due to its ecofriendly and sustainable behavior, bioremediation techniques have provedattested to be a significant device in treating the sites that are polluted by chemical pesticides.
Key Words – *Bioremediation, Pesticides and Eco-friendly Approach.*

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INTRODUCTION

With the increase in environmental contamination due to the continuous rise in population, industrialization and urbanization , a potential hazard to human health has also increased and a major contributor of this contamination are the pesticides which are widely used for the minimization of crop pests and thus protection of crops from yield losses. Pesticides have become a significant feature of modern agriculture due to their necessity in economical pest management and enhancement of product quality[1]. But unlimitedapplication of pesticide results in the degradation of the atmosphere, around 90% of the applied agricultural pesticides fail to reach their target organisms and disperse through air, soil and water. Out of the total volatile emission to the environment, 63% are pesticides [2]. Above all their ability to accumulate into the tissues of living organisms leading to bioaccumulation is the major concern. All these factors have responsible for environmental pollution and major steps will be taken to tackle this problem.

The conventional technique used for the treatment of these contaminants are effective but also have certain drawbacks like cost, complexity and pollution,also in many cases these techniques are not sufficient [3]. Therefore, the employment of an alternative method for the remediation of such contaminants is very necessary. On this regard, bioremediation is an effective and innovative solution for pollution abatement.

Basically, bioremediation is an emerging technology that uses microorganisms to remediate polluted sites. The advantages like cost effectiveness and ecofriendly approach have made this technique an alternative to physiochemical methods.Bacteria, yeast and fungi are the main biological agents used in bioremediation [4].

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DIVA TECHNOLOGY: INDISPENSABLE TOOL FOR THE CONTROL OF JOHNE'S DISEASE

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KEYWORDS

Paratuberculosis

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Secreted antigens

DIVA

Vaccine

Vaccination

ABSTRACT

Ruminant Paratuberculosis (Johne's disease) is categorized as List B disease by OIE. Paratuberculosis is a disease of socio-economic and public health importance and has significant effect on in the international trade of animals and animal products. Control of paratuberculosis is priority in many countries and different countries have designed their own control programs tailored to their farming practices and geographical conditions. However, the major component shared by these control programs is "Test and Cull" policy. Due to inability of detecting paratuberculosis in early stages this policy has globally failed to control the disease and hence there is global urgency in developing control measures. Vaccination has shown promise in controlling this disease. However, vaccination in present form cannot be used due to lack of DIVA (Differentiation of Infected from Vaccinated Animals) technology, because present vaccines interfere with diagnosis of naturally infected paratuberculosis animals and animals infected with tuberculosis. Therefore markers are needed to be identified for developing DIVA. This paper summarizes the findings of vaccination trials conducted in different countries and highlights the importance of vaccination in controlling paratuberculosis and also discusses strategies for developing DIVA for paratuberculosis vaccines.

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Comparative efficacy of MIRU-VNTR and IS 6110-RFLP for differentiation of *Mycobacterium tuberculosis* isolates

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Abstract

The aim of this study was To characterize Mycobacterium tuberculosis isolates by MIRU-VNTR typing and IS 6110 – RFLP and to compare the efficiency of MIRU-VNTR typing and IS 6110 – RFLP in discriminating Mycobacterium tuberculosis isolates. In Mycobacterium genome a large number of insertional and repetitive elements have been identified. In the genome of Mycobacterium tuberculosis insertation sequence IS 6110 is present.. In Mycobacterium tuberculosis, 41 mini satellites like structure have been identified. They are specific class of variable number of tandem repeats at different loci varies between strain. MIRU-VNTR, is a widely accepted technique for strain typing of Mycobacterium tuberculosis. Analysis of fingerprinting of M.tuberculosis strains showed the presence of both low (5%) and multiple (95%) IS6110 copy number strains. After genotyping the same isolates by MIRU-VNTR typing it is showed that MIRU-VNTR typing is more sensitive than IS 6110-RFLP. As MIRU-VNTR typing is less time taking, less DNA are required and Bands obtained are clear so easy to interpretate.

Key Words: MIRU-VNTR, IS 6110, *Mycobacterium tuberculosis*

INTRODUCTION

The famous German microbiologist Robert Koch isolated and described the causative agent of tuberculosis, *Mycobacterium tuberculosis* in 1882. At one time tuberculosis was the single most important infectious disease of humans and amounted for one seventh of all deaths worldwide. Even today tuberculosis still accounts for almost 3 million deaths per year, more than 5% of all deaths and up to one third of the world's populations have been infected with *M.tuberculosis.*

IS 6110 RFLP [1] is current gold standard method for *Mycobacterium tuberculosis* typing and is extensively used for epidemiological and population based studies [2].

There are several PCR based methods used in genotyping are RAPD [3,4] AFLP [5,6], DR based method [7], VNTR typing [8], MIRU-VNTR typing [9], Spoligotyping [10].

Mycobacterium interspersed repetitive units (MIRUs) and VNTR sequences are scattered throughout the *Mycobacterium tuberculosis* genome. 12 out of 41 MIRU loci present in the *Mycobacterium tuberculosis* H_{37} Rv genome correspond to human mini satellite like VNTR region among non-related isolates of different geographical origin [11]. A PCR based typing method by using these 12 loci provides a resolution comparable to that of *IS 6110-RFLP*.

The complementarily of information about genetic relationship inferred from MIRU-VNTR and *IS 6110-RFLP* typing would be highly significant for epidemiological study of tuberculosis.This study has been undertaken to

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Research Article

Development of New 'Indigenous Dot-ELISA Kit' as Sensitive Field Based Herd Screening Test for the Diagnosis of Johne's Disease in the Domestic Buffalo Population

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Abstract

Johne's disease is endemic in the domestic riverine buffalo population of the country and bio-load of Mycobacterium avium subspecies paratuberculosis is increasing in the absence of indigenous diagnostic kits and control programs. A new 'dot-ELISA kit' has been developed and validated with indigenous plate ELISA for the screening of buffaloes against Johne's disease. Out of 156 serum samples screened 41.0 (64), 85.8 (134) and 85.2% (133) were positive for MAP infection by indigenous plate ELISA kit condition (A), condition (B) and indigenous dot ELISA, respectively. Dot-ELISA kit detected 85.2 (133) and 90.3% (141) buffaloes as positive together with indigenous plate ELISA kit in condition A and B, respectively. Comparison of 'Indigenous plate-ELISA' with 'Indigenous dot-ELISA' revealed substantial agreement between two tests. Study showed that 'Indigenous dot-ELISA test' has potential to be sensitive and cost effective 'Field based herd screening test' for the large scale screening of the domestic livestock population against Johne's disease. The study also showed that despite high slaughter rate, incidence of Johne's disease was high in native population of riverine buffaloes (Bubalus bubalis) and call for immediate control of disease.

Key words: *Mycobacterium avium* subsp., *paratuberculosis*, plate-ELISA, dot-ELISA, Johne's disease, herd screening test

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RESEARCH ARTICLE
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Immunomodulatory activity of aqueous extract of *Nyctanthes arbor-tristis* flowers with particular reference to splenocytes proliferation and cytokines induction

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Abstract

Objectives: To investigate the immunomodulatory activity of aqueous extract of *Nyctanthes arbor- tristis* flowers (NAFE) with particular reference to splenocytes proliferation and induction of cytokines. **Materials and Methods:** Antibody titer was determined by tube agglutination and indirect ELISA assay in four groups of mice-control, antigen alone, and NAFE-treated (400 and 800 mg/kg for 21 days) after immunization with *Salmonella* antigen while cellular immunity was studied in three groups of rats (control and NAFE-treated - 400 and 800 mg/kg) following DNCB application. Splenocytes from untreated and NAFE-treated rats were stimulated using concanavalin-A (Con-A) and optical density (OD) and stimulation index were determined. Splenocytes from control rats were also treated *in vitro* with NAFE (50–1600 μg/ml) and Con-A to determine the effect on splenocytes proliferation. Interleukin-2 (IL-2) and IL-6 levels in splenocytes supernatant from control and NAFE-treated rats and following *in vitro* treatment of splenocytes with NAFE (50–1600 μg/ml) were determined using ELISA kits. **Results:** Marked to a significant increase in antibody titer by both the methods in NAFE-treated mice and a significant increase in skin thickness in rats after challenge with DNCB, respectively suggested humoral and cell-mediated immunostimulant potential of NAFE. Significant increase in OD and stimulation index following e *x vivo* and *in vitro* exposure of splenocytes and sensitization with Con-A and significant elevation in IL-2 and IL-6 levels in splenocytes supernatant was also observed after their *ex vivo* and *in vitro* exposure to NAFE. **Conclusion:** Humoral and cell-mediated immunostimulant activity of NAFE seems to be mediated through splenocytes proliferation and increased production of cytokines, especially IL-2 and IL-6.

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Full Text

Nyctanthes arbor- tristis, family- Oleaceae, is commonly known as harsingaar or night jasmine. Nyctanthes means "night flowering" and arbor tristis means the "sad tree" as it loses its brightness during daytime. Its flowers open at dusk and finish at dawn and have pleasant fragrance. Several studies on phytoconstituents of extracts of leaves, stem bark, seeds, roots, and flowers of N. arbor- tristis have been taken up, but leaves are the most studied ones and have been reported to contain nyctanthine, an alkaloid, in addition to mannitol, resinous substance, ascorbic acid, coloring agent, sugar, traces of oily substances, tannic acid, methyl salicylate, carotene, etc.[1],[2],[3] Flavonoid and iridoid glycosides have also been detected in the leaves of N. arbor-tristis.[4] Seed

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ORIGINAL PAPER

Vulnerabilities of macrophytes distribution due to climate change

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Abstract The rise in the earth's surface and water temperature is part of the effect of climatic change that has been observed for the last decade. The rates of climate change are unprecedented, and biological responses to these changes have also been prominent in all levels of species, communities and ecosystems. Aquatic-terrestrial ecotones are vulnerable to climate change, and degradation of the emergent aquatic macrophyte zone would have contributed severe ecological consequences for freshwater, wetland and terrestrial ecosystems. Most researches on climate change effects on biodiversity are contemplating on the terrestrial realm, and considerable changes in terrestrial biodiversity and species' distributions have been detected in response to climate change. This is unfortunate, given the importance of aquatic systems for providing ecosystem goods and services. Thus, if researchers were able to identify early-warning indicators of anthropogenic environmental changes on aquatic species, communities and ecosystems, it would certainly help to manage and conserve these systems in a sustainable way. One of such early-warning indicators concerns the expansion of emergent macrophytes in aquatic-terrestrial ecotones. Hence, this review highlights the impact of climatic changes towards aquatic macrophytes and their possible environmental implications.

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1 Introduction

Global change has been revealed and forecast to have major effects on biodiversity at local, regional and global scales. The global change constitutes a number of different forms of anthropogenic impacts, including land use alterations, nitrogen deposition and invasions of exotic species, much recent interest has been directed at climate change (Sala et al., 2000; Parmesan, 2006; Hossain and Rama Rao, 2014). Although the earth has experienced considerable climate changes in the past, the rate and magnitude of the recent and projected future changes are unprecedented (IPCC, 2001; Hossain et al., 2016). Furthermore, the effect of future climate change on biodiversity has been predicted to be unparalleled, with 15–37 % of terrestrial species possibly facing extinction due to climate change alone in the next 50 years (Thomas et al., 2004), and a similarly dark future has been suggested for freshwater species in the next few decades (Xenopoulos et al., 2005). Biodiversity, integrity and functioning of different ecosystems are facing serious problems on the global scale and freshwaters are one of the most highly threatened ecosystems. Thus, research on the effects of climate change on freshwater organisms and ecosystems has increased hastily in the last decade.

Evaluation of anthropogenic impacts on freshwaters relies on the integrity of community structure of biological groups and on the presence of indicator species that provides information about ecological quality in a water body (Rickert and Hines 1978; Carpenter et al. 2006). Aquatic macrophytes belong to one traditionally studied biological group in ecological assessments. Macrophytes indicate well on long-term changes

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REVIEW ARTICLE

Green remediation. Tool for safe and sustainable environment: a review

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Abstract Nowadays, the bioremediation of toxic pollutants is a subject of interest in terms of health issues and environmental cleaning. In the present review, an eco-friendly, cost-effective approach is discussed for the detoxification of environmental pollutants by the means of natural purifier, i.e., blue–green algae over the conventional methods. Industrial wastes having toxic pollutants are not able to eliminate completely by existing the conventional techniques; in fact, these methods can only change their form rather than the entire degradation. These pollutants have an adverse effect on aquatic life, such as fauna and flora, and finally harm human life directly or indirectly. Cyanobacterial approach for the removal of this contaminant is an efficient tool for sustainable development and pollution control. Cyanobacteria are the primary consumers of food chain which absorbed complex toxic compounds from environments and convert them to simple nontoxic compounds which finally protect higher food chain consumer and eliminate risk of pollution. In addition, these organisms have capability to solve secondary pollution, as they can remediate radioactive compound, petroleum waste and degrade toxins from pesticides.

Keywords Toxic pollutants · Bioremediation · Cyanobacteria · Sustainable development

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Introduction

Pollution is the addition of pollutant to the environment that causes an adverse effect to the life. There are different types of pollution, but among them, water pollution is an important subgroup. Water is the vital component for life. Surface water and ground water are the major sources of drinking water in rural and urban areas, but due to high industrialization in the recent past decades, the quality has been severely affected (Bharti et al. 2013). Due to industrial revolution, various industries, such as chemical, nuclear, textiles, oil refinery, etc., come in existence, which are a major concern (Persson and Destouni 2009). The problem of water pollution arises due to the release of organic and inorganic pollutants by anthropogenic activity which creates and causes severe health damage (Raouf et al. 2012). Direct disposal of effluents containing pollutants results in the toxicity of surface water bodies and land around industrial areas which leaches down and contaminates ground water bodies to their high density (Prabha et al. 2013). Aquatic system gets to accumulate with high risk of toxins which in turn mixed and transfer into the food chain and finally reaches to humans (Shaikh and Bhosle 2011). After entering into human body, these pollutants cause severe damage to health in terms of renal, cardiovascular, and neurological disorders and are even life threatening (Table 1). It has also been reported that nickel and chromium have a carcinogenic effect on human health (Duruibe et al. 2007).

Various physical and chemical methods are used for the detoxification of effluents, but rather than complete degradation, they only change their forms. These changed forms are even toxic and have ability to cause damage even in a very low concentration (Noel and Rajan 2014). Bioremediation over the conventional methods is most

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Review Article

Abrogated cardio protective effect of ischemic preconditioning in hyperhomocysteinemia and hypertrophy

Shaiba Sana Qureshi, Ahsas Goyal *

Institute of Pharmaceutical Research, GLA University, Mathura, UP, India

ARTICLE INFO

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Ischemia preconditioning
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ABSTRACT

Coronary heart disease has almost affected the mankind throughout history. During the last century, this disorder has emerged as a leading cause of death all over the world. Ischemia contributes in the development of myocardial infarction, stroke, peripheral vascular insufficiency and hypovolemic shock. Reperfusion enhances the tissue injury produced by ischemia alone. Cellular damage after reperfusion of formerly viable ischemic tissues is known as ischemia–reperfusion (I–R) injury. Ischemic preconditioning is known as the phenomenon in which the short intermittent cycles of ischemia and reperfusion has shown to improve myocardium against subsequent prolonged ischemia–reperfusion (I–R)induced injury. Experimentally, preconditioning has revealed to improve ventricular function and to decrease apoptosis and myocardial neutrophil accumulation after ischemia reperfusion injury. Recently, ischemic preconditioning has been demonstrated to have a beneficial effect on recovery of right ventricular contractility in coronary artery bypass grafting and to improve liver injury during hepatic resection. The cardioprotective role of ischemic preconditioning is well established, but it is lost in various clinical conditions such as hyperhomocysteinemia and cardiac hypertrophy. In this review, we have discussed the various signaling pathways which are involved in abrogated preconditioning in hyperhomocysteinemia and cardiac hypertrophy.

1. Introduction

Coronary heart disease is a growing problem, affecting the mankind across the world. It is the most common cause of cardiovascular death and stroke.[1] Myocardial ischemia is defined as an insufficient blood supply to the myocardium.[2] Although early reperfusion protects the myocardium from damage, yet reperfusion after a prolonged ischemic insult causes tissue injury which is known as ischemia reperfusion (I/R) injury.[3,4] It is characterized by a cascade of adverse events i.e. metabolic disorder, cell death and local inflammatory responses that leads to myocardial ultrastructural changes and subsequently myocardial systolic and diastolic dysfunction.[5–7] It has been reported that reactive oxygen or nitrogen species (ROS or RNS), including superoxide radicals, hydrogen peroxide, hydroxyl radicals, singlet oxygen, nitric oxide, and peroxynitrite ($ONOO^-$) are majorly responsible for myocardial I–R injury.[8,9]

1.1. Ischemic preconditioning and its molecular mechanism

This concept of preconditioning to prevent I/R injury was given by Murry and coworkers in 1986. They suggested that brief intermittent periods of sublethal ischemia followed by reperfusion have a protective effect on myocardial tissue against prolonged ischemic insult which is called "ischemic preconditioning" (IPC).[10,11] Ischemic preconditioning is a biphasic phenomenon, an early phase which starts within minutes and wanes off gradually within 2–3 h and called as classical preconditioning.[12,13] The other is late phase which is delayed to 12–24 h after the ischemic stress and lasts up to 3–4 days and called as late phase

Abbreviations: (I–R), ischemia–reperfusion injury; IPC, ischemia preconditioning; ROS, reactive oxygen species; RNS, reactive nitrogen species; ($ONOO^-$), peroxynitrite; PI3K, phosphatidylinositol 3-kinase; PIP3, phosphatidyl-inositol 3,4,5-triphosphate; PIP2, phosphatidyl inositol 3,4-biphosphate; PDK1, phosphoinositide-dependent kinase; mitoK_{ATP}, mitochondrial ATP-sensitive potassium channels; DAG, diacylglycerol; IP3, inositol triphosphate; PKC, protein kinase C; mPTP, mitochondrial permeability transition pore; GSK-3β, glycogen synthase kinase-3β; Hhcy, hyperhomocysteinemia; LDL, low density lipoproteins; TNF-α, tumor necrosis factor-α; NF-κB, nuclear factor NF-kappa-B; CK, creatinine kinase; LDH, lactate dehydrogenase; JAK, Janus kinase; Akt, protein kinase B; ATP, adenosine triphosphate; DOCA, deoxycorticosterone acetate; EAAT2, excitatory amino acid transporter 2; SHR, spontaneously hypertensive rats.

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Review Article

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ABSTRACT

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Role of atrial natriuretic peptide in ischemic preconditioning-induced cardioprotection in the diabetic rat heart

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doi: 10.1016/j.jss.2015.10.045. Epub 2015 Nov 6.

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- DOI: 10.1016/j.jss.2015.10.045

Abstract

Background: It has been noted that nitric oxide (NO) is involved in the ischemic preconditioning (IPC)-mediated cardioprotection. Diabetes is a downregulator of atrial natriuretic peptide (ANP), resulting in low expression of endothelial nitric oxide synthase (eNOS) by which NO level get reduced. The purpose of the present study was to investigate the role of ANP in attenuated cardioprotective effect of IPC in the diabetic rat heart.

Methods: The heart was isolated from the diabetic rat and mounted on Langendorff's apparatus, subjected to 30-min ischemia and 120-min reperfusion. IPC was mediated by four cycles of 5-min ischemia and 5-min reperfusion. The infarct size was estimated using triphenyltetrazolium chloride stain, and coronary effluent was analyzed for lactate dehydrogenase and creatinine kinase-MB release to assess the degree of myocardial injury. The cardiac release of NO was estimated indirectly by measuring the release of nitrite in coronary effluent.

Results: IPC-mediated cardioprotection was significantly attenuated in the diabetic rat as compared with the normal rat. Perfusion of ANP (0.1 μM/L) in the diabetic rat heart significantly restored the attenuated cardioprotective effect of IPC and also increased the release of NO. However, this observed cardioprotection was significantly attenuated by perfusion of N-nitro L-arginine methyl ester, an eNOS inhibitor (100 μM/L) noted in terms of increase in myocardial infarct size, release of lactate dehydrogenase and creatinine kinase-MB, and also decreases in release of NO.

Conclusions: Thus, it is suggested that ANP restores the attenuated cardioprotective effect in the diabetic heart which may be due to increase in the expression of eNOS and subsequent increase in the activity of NO.

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DEVELOPMENT AND VALIDATION OF STABILITY INDICATING ASSAY F RP-HPLC IN TABLET DOSAGE FORM

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Received: 19 Dec 2015 Revised and Accepted: 25 Jan 2016

ABSTRACT

Objective: To development and validation of a stability indicating reverse phase HPLC (RP-HPLC) method antifungal drug, and its assay method, in tablet dosage forms.

Methods: The proposed RP-HPLC method utilizes Shiseido C18, 250 mm × 4.6 mm i.d., 5µ column (at ambien Methanol and Water (70:30) as mobile phase], at a flow rate of 1.0 ml/minute, and UV detection at 291 nm for a was selected after applying different chromatographic conditions, the chromatographic variables like flow rat and nature of stationary phase were studied.

Results: The reported method is linear over the range of 0.1-1.2µg/ml with a coefficient of correlation (r^2) valu 19093. The precision study revealed that the percentage relative standard deviation was within the acceptab found to be between 98%-102%. Griseofulvin was exposed to acidic, alkaline, oxidative, thermal and photolyt was taken at different time intervals. The stressed samples were analyzed by the proposed method. The propo analysis stability testing and assay of griseofulvin in quality control laboratories.

Conclusion: An economical, accurate, sensitive and precise HPLC method with ultraviolet detection was devel control analysis of griseofulvin in tablets. The proposed method is very rapid, where the total analytical run time

Keywords: RP-HPLC, Method validation, Griseofulvin, Estimation

INTRODUCTION

Griseofulvin is an antifungal drug that is administered orally. It is used both in animals and in humans, to treat fungal infections of the skin (commonly known as ringworm) and nails. It is derived from the mold *Penicillium griseofulvum*. Griseofulvin (7-chloro-2', 4, 6-trimethoxy-6'-methyl-Gris-2'-en-3, 4'-Dione) is primarily used to treat dermatophyte infections in humans and animals. Griseofulvin is a poorly water-soluble drug, which displays a dissolution rate-limited absorption pattern in humans and animals. Hence, it is often used as a model drug to assess the influence of various physicochemical, physiological, and dosage form factors on the absorption kinetics and bioavailability of hydrophobic drugs. Its molecular formula is $C_{17}H_{17}ClO_6$. Its molecular weight is 352.766, and physical state is a yellowish white crystalline powder with slight peculiar odor. It is freely soluble in DMF, methanol, ethanol, practically insoluble in water. UV λ max is 291 nm in methanol [1]. The structure of griseofulvin shown in (fig. 1).

In this method, isocratic elution of griseofulvin because

It gave better baseline separatio for the routine analysis of gri present study, we hereby report stability indicating isocratic reve for analysis of griseofulvin in th as per ICH guidelines.

MATERIALS AND METHODS

Chemicals and reagents

Griseofulvin was provided by Methanol was from merk Specia was from spectrochem Pvt. Ltd.,

All chemicals were at least of an Purified HPLC grades water

Was obtained by reverse osmos

Indian Heart Journal

Volume 68, Issue 6, November–December 2016, Pages 856-861

Review Article

Role of cardiac renin angiotensin system in ischemia reperfusion injury and preconditioning of heart

Vimal Agrawal, Jeetendra Kumar Gupta, Shaiba Sana Qureshi, Vishal Kumar Vishwakarma

https://doi.org/10.1016/j.ihj.2016.06.010

Abstract

Cardio-vascular diseases are the leading cause of morbidity and mortality. Ischemia is a state of oxygen deprivation in tissues, whereas reperfusion is restoration of blood flow in ischemic tissues. Myocardial damage of tissue during reperfusion after ischemic insult is known as myocardial ischemia–reperfusion (I/R) injury. It induces damage to cardiac muscle via increasing expression of oxygen, sodium and calcium ions which are responsible in the activation of proteases and cell death. Heart renin angiotensin system (RAS) plays an important role in the myocardial ischemia and reperfusion injury. Angiotensin (1–7) is responsible for vasodilation and angiotensin II for vasoconstriction. Here-in we reviewed how myocardial I/R injury sets in by up-regulation of angiotensin II that leads to increased infarct size, which can be reduced by the use of ACE inhibitors, ACE2 activators and angiotensin II antagonist.

Article PDF Available

Improvement in renal function of hyperhomocysteinemic rats by co-enzyme Q10

January 2016 · International Journal of Pharmaceutical Sciences Review and Research 39(1):216-218

Authors:

Shaiba Sana Qureshi

Jeetendra Kumar Gupta
GLA University

Abstract and Figures

The aim of the study was to evaluate the potential role of Coenzyme Q10, a lipophilic moiety against renal impairment in hyperhomocysteinemic rat. Twenty Wistar albino rats were divided into four groups. Each group had five animals. Group 1 served as control group who received normal diet (chow feed) and water ad libitum. Group 2 hyperhomocysteinemia (HHCY Control) were fed on L-methionine (1.7g/kg/day, p.o.) once a day. The third group (test drug 1) was treated with Coenzyme Q10 at a low dose of (50 mg/kg body weight) + L-methionine (1.7g/kg/day, p.o.) through oral gavage. The fourth group (test drug 2), received high dose of Coenzyme Q10 (100 mg/kg body weight) + L-methionine (1.7g/kg/day, p.o.) through same route. Additionally, doxorubicin injections at a dose of 5 mg/kg was given through intraperitoneal route after 1 hour of L-methionine dosing at an interval of 15 days to second, third and fourth groups of animals to induce hyperhomocysteinemia mediated nephrotoxicity. The experiment was terminated after 28 days, animals were killed and homocysteine, creatinine and urea concentration in the serum were determined. The serum homocysteine, creatinine and urea levels were determined. These levels in HHCY group were significantly elevated with respect to normal group of animals and were characterized with severe hyperhomocysteinemia. The levels were reduced in the Coenzyme Q10 (50 and 100 mg/kg, p.o) treated groups in dose dependent manner when compared to the HHCY group. Coenzyme Q10, fat soluble moiety can be considered as a feasible candidate for nephroprotection in rats with hyperhomocysteinemia.

Role of atrial natriuretic peptide in various conditions

July 2016

Authors:


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Abstract

Atrial natriuretic peptide (ANP) was discovered twenty years ago and has a crucial role in regulating blood pressure, body fluid homeostasis and maintaining cardiovascular function. Evidences from animal model reported a decrease in estrogen level via ANP gene inhibition. Estrogen induces ANP release via ER dependent mechanism from the heart and prevents cardiac hypertrophy. It has been reported that mice lacking ANP exhibit high blood pressure due to loss of cGMP (vasodilator). ANP also inhibit L-type Ca +2 channel in the heart, induce vasorelaxation in arteries, decrease sympathetic nervous system activity and suppress RAAS. It has been reported that a potent vasoconstrictor (Endothelin) augments ANP secretion and up regulates ANP messenger RNA. Reduced ANP contributes in increased fluid retention in obese individuals. Pro-BNP has shown an independent risk factor for CVD with diabetes. Natriuretic peptides cause augmentation in GFR, thus contributing in glomerular hyperfilteration in diabetic rat heart. ANP improves the attenuated cardioprotective effect of ischemia preconditioning by increasing the activity of NO in diabetic rat heart. Over the past decade, ANP became an essential tool in the management of various metabolic disorders. In this article, we have focused on the physiological effects of ANP referring hypertension, hyperlipidemia, diabetes mellitus, estrogen deficiency, ischemia reperfusion injury, ischemia preconditioning and endothelins.

Int J Pharm Bio Sci 2016 July; 7(3): (P) 20-27

Review Article

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International Journal of Pharma and Bio Sciences

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ROLE OF ATRIAL NATRIURETIC PEPTIDE IN VARIOUS CONDITIONS

INNOVARE JOURNAL OF MEDICAL SCIENCES

Vol 4, Issue 2, 2016

A REVIEW ON HYPERHOMOCYSTEINEMIA AND ITS RISK

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Received: 05 December 2015, Revised and Accepted: 19 February 2016

ABSTRACT

Hyperhomocysteinemia (Hhcy) is a biochemical abnormality characterized by abnormally large levels of homocy reactive sulfur-containing amino acid derived from methionine, an essential amino acid. Excess Hcy produced in t regulated cell environment into the blood. It is the role of the liver and kidney to remove excess Hcy from the b of reactive oxygen species by activating nicotinamide adenine dinucleotide phosphate oxidase. It downregulat synthase and thus reduces the bioavailability of NO. Moreover, it increases the production of proinflammatory cy by activating nuclear factor-kappa B. Hhcy is caused by the excess deficiencies of the vitamins such as pyridoxin considered as an independent risk factor for various cardiovascular diseases such as endothelial dysfunction, vas hypertension, cardiac hypertrophy, and heart failure. Many evidences are available which suggest that ignoring Hc disease would be unwise. Thus, there is an urgent need for health care providers to develop effective preventic acid, Vitamin B6, and Vitamin B12 supplementation as well as lifestyle change) to reduce this disorder.

Keywords: Homocysteine, Stroke, Folic acid, Vitamin B6, Vitamin B12, Atherosclerosis.

INTRODUCTION

Hyperhomocysteinemia (Hhcy) is a disorder characterized by an abnormal increased level of homocysteine (Hcy) in the blood, above 15 μmol/L [1]. Jukes reported that Hcy is a sulfur-containing amino acid, isolated from a urinary bladder stone in 1933 by Vincent du Vigneaud [2]. It has been under a lot of speculation since its discovery. Its chemical property showed a similarity to cysteine; hence, the name is Hcy. Hcy is an amino acid produced via demethylation of dietary methionine, which is abundant in animal protein [3,4]. It is the role of the liver and kidney to remove excess Hcy from the blood. People with Hhcy get blood clots in their veins and arteries (e.g., deep vein thrombosis and pulmonary embolism). Hcy is a key determinant of the methylation cycle. It is metabolized either by remethylation pathway to methionine or the transsulfuration pathway to cysteine. Condensation of methionine with adenosine triphosphate (ATP), leads to the formation of s-adenosylmethionine (SAM), a principle methyl donor for all methylation reactions in cells [5,6]. The demethylation reaction leads to the formation of s-adenosylhomocysteine (SAH) which further leads to the formation of Hcy and adenosine. The former pathway of Hcy metabolism is dependent on the proper functioning of methylene tetrahydrofolate reductase (MTHFR) enzyme, methionine synthetase, Vitamin B12, and folic acid. The later pathway is dependent on the enzymes cystathionine beta-synthetase and MTHFR [7].

The prevalence of Hhcy varies widely with geography, sex, ethnicity, and

Columbians and 25-57% in Mexi have a high prevalence of Hhcy, wh betel nut use [8,9].

CAUSES OF HHCY

Dietary factor

Hcy elevation occurs because of p components). If a person takes hi egg, chicken, milk, etc., he should a in his diet. The absence of these vit

Life style factors

Smoking is associated with vascul related to Hhcy. The number of cig determinants of Hcy levels. Nicotin catabolises folate cycle. Physical ac since it is the cheapest way of stren risk of cardiovascular diseases (CV concentrations of total plasma Hcy of developing CVD in healthy and with age, changes in gastrointesti enzyme defects, and a higher occu in elderly [11].

Vitamin deficiency

Article

Citicoline: A Potential Breakthrough in Cerebrovascular Disorder

February 2016
Project: M.Pharm

Authors:

Shaiba Sana Qureshi

References (45)

Abstract

Citicoline, CDP Choline or Cytidine diphophocholine is a novel drug with a broad spectrum of benefits for condition associated with neurological dysfunction. Citicoline is an endogenous compound and an essential intermediate in the synthesis of phosphatidylcholine (cell membrane phopholipid). It is launched worldwide (outside of US and Canada only) as a drug for stroke and head injuries. It p'ays important roles in structural integrity, signaling of cell membrane and plays important role in human physiology. It supports the synthesis of Acetylcholine and Betaine, a methyl donor to generate phospholipids. Citicoline attenuates the production of free radicals in Ischemic condition and also stimulates the activity of glutathione reductase and has the ability to promote learning and improve cognitive impairment in Parkinson's and Alzheimer's disease. Citicoline administration reduces the severity of mental and motor deficits associated head injuries and supports eye health and mental health. Pharmacokinetics suggests that it is well absorbed and high bioavailable orally. A dose of 500mg to 2000 mg per day is an effective based on clinical trials and is safe for use in elderly population and pediatrics. It has the ability to improve phospholipid metabolism, with a consequent improvement in the deteriorated axonal flow of dopamine.

ASIAN JOURNAL OF PHARMACEUTICAL AND CLINICAL RESEARCH

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PREVALENCE AND RISK FACTOR OF POLYCYSTIC OVARIAN

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ABSTRACT

Polycystic ovarian syndrome (PCOS) is the most common endocrine disorder in women. Its clinical manife disturbance of reproductive and metabolic functions. PCOS is clinical and public health importance because it of reproductive age. It is an X-linked dominant condition and has diverse clinical implications such as psycholo reproductive features (hirsutism and hyperandrogenism), and impaired glucose tolerance. It is widely dependent factors including lifestyle and body weight. Weight loss improves the endocrine profile and increases chance be treated with medications such as clomiphene citrate, tamoxifen, aromatase inhibitors, and gonadotrophin *in vitro* fertilization when other treatment fails. Its prevalence is estimated at 4-8% from studies performed in Sp exercise, and behavior therapy improves fertility. PCOS has unique interactions with the ever increasing obesit induced insulin resistance significantly aggravates all the features of PCOS. Education about how PCOS affects l to women with this disorder to feel physical and psychological benefits so that they could engage themselves mo

Keywords: Polycystic ovarian syndrome, Hyperinsulinemia, Hormone disbalance, Hirsutism, Ovarian cyst, Obes

INTRODUCTION

Polycystic ovarian syndrome (PCOS), Stein–Leventhal syndrome, or hyperandrogen anovulation syndrome are a common hormonal condition which was first diagnosed by physicians in 1930. It is called a syndrome because it refers to a number of symptoms which are experienced at the same time. It is both emotionally and physically challenging. In the 20th century, polycystic ovarian disease condition was poorly understood. On 3 December, 2012, National Institutes of Health held a conference on this disorder and sponsored an evidence-based methodology workshop which clarifies its benefits, drawbacks, causes, predictors, long-term consequences and treatment and prevention strategies. Hormones are chemical messengers that trigger many processes including growth, development, and energy production; their job is to signal the release of other hormones. During each menstrual cycle, follicles develop and form eggs, one of which is released during ovulation. After this process, the follicles break down and disappear. With PCOS, these follicles stop growing and become cyst. Polycystic ovarian disease (PCOD) is a health issue in which female sex hormones gets disturbed, 12 or more tiny cysts in ovaries make a tiny amount of androgen (male sex hormone) that causes irregular periods. PCOS causes unwanted changes in the appearance of women and overtime, can lead to serious health problems such as heart diseases, diabetes, high cholesterol, and high blood pressure. PCOS is affecting control the long-term problems a Other organs which are affected by vasculature, and pancreas [6-10].

SYMPTOMS

The symptoms of PCOS usually bec It varies from women to women. Sy conditions. The common symptom irregular periods, many small cyst and prolactin hormones, acne (or respond to usual treatment), rapid hirsutism (excess hair growth on fac or buttocks, affect 70% of women metabolic dysfunction, difficulty ge loss from the head, oily skin, depre thickened velvety darkened skin on is known as *Acanthosis nigricans*, p stops for short period of time), ob obese), fatigue (very low energy lev

CAUSES

The exact cause of PCOS is not un abnormal hormonal balance. In

Hemin, a heme oxygenase-1 inducer, restores the attenuated cardioprotective effect of ischemic preconditioning in isolated diabetic rat heart

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Abstract

Background: Attenuated cardioprotective effect of ischemic preconditioning (IPC) by reduced nitric oxide (NO) is a hallmark during diabetes mellitus (DM). Recently, we reported that the formation of caveolin-endothelial nitric oxide synthase (eNOS) complex decreases the release of NO, which is responsible for attenuation of IPC-induced cardioprotection in DM rat heart. Heme oxygenase-1 (HO-1) facilitates release of NO by disrupting caveolin-eNOS complex. The activity of HO-1 is decreased during DM. This study was designed to investigate the role of hemin (HO-1 inducer) in attenuated cardioprotective effect of IPC in isolated diabetic rat heart.

Methods: DM was induced in male Wistar rat by single dose of streptozotocin. Cardioprotective effect was assessed in terms of myocardial infarct size and release of lactate dehydrogenase and creatine kinase in coronary effluent. The release of NO was estimated indirectly by measuring the release of nitrite in coronary effluent. Perfusion of sodium nitrite, a precursor of NO, was used as a positive control.

Result: IPC-induced cardioprotection and increased release of nitrite were significantly attenuated in a diabetic rat as compared to a normal rat. Pretreatment with hemin and daidzein, a caveolin inhibitor, alone or in combination significantly restored the attenuated cardioprotection and increased the release of nitrite in diabetic rat heart. Zinc protoporphyrin, a HO-1 inhibitor, significantly abolished the observed cardioprotection and decreased the release of nitrite in hemin pretreated DM rat heart.

Conclusion: Thus, it is suggested that hemin restores the attenuated cardioprotective effect in diabetic rat heart by increasing the activity of HO-1 and subsequently release of NO.

Keywords: Heme oxygenase-1; daidzein; diabetic rat heart; hemin; ischemic preconditioning.

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OINTMENT OF METHANOLIC EXTRACT OF FICUS RELIGIOSA: A TRADITIONAL APPROACH IN WOUND HEALING IN RATS

Abstract

The methanolic extract (ME) of leaves of *Ficus religiosa* (Family: Moraceae) was evaluated for their wound healing activity in rats. It was carried out in rats by employing excision wound models following topical application. The qualitative preliminary phytochemical analysis of ME indicated the presence of tannins, triterpenoids, alkaloids and steroids. All healthy animals of either sex were grouped into four groups and each group contains six rats. The rats of ointment (5 and 10 %w/w) of ME treated were compared to povidone-iodine ointment treated as a standard. The results of present work revealed that the 10%w/w ointment of ME of *Ficus religiosa* treated wounds showed significant reduction of wound contraction area as compared to control and indicated rapid epithelialisation.

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INVESTIGATION OF ANTIDIARRHOEAL ACTIVITY OF ETHANOLIC EXTRACT OF TAMARINDUS INDICA L. SEEDS IN ALBINO WISTAR RATS

Dr. Reena Gupta

ABSTRACT

Context: Nowadays scientist increasing interest in the field of research and development to investigate the employ of Indian traditional medicine in the treatment and prevention of diarrhea. Frequent of passage of three or more loose or watery stools and unformed feces per day indicates diarrhea. Diarrhea is a major cause of ill-health, especially for children because, particularly, rotavirus responsible for it. Traditionally, Tamarindus indica seed is employed in the management of diarrhea. Aims: The aim of recent research to study the traditional claim of ethanolic (alcoholic) extract of T. indica L. (EETI) seed for antidiarrheal activity in albino Wistar. Materials and Methods: The extract of T. indica seeds was developed using successive solvent extraction using ethanol at room temperature in a soxhlet apparatus. The preliminary phytochemical study was carried out for the identification of active phytoconstituents that elicit antidiarrheal action in albino Wistar rats. Statistical Analysis Used: Yes. The results of in-vivo pharmacological studies were represented as mean ± standard error of mean. The total variations present in data were evaluated using Graph Pad Prism 5 project software analysis of variance followed by Student's t-test. The result was considered statistically significant when the value of $P < 0.05$ versus control. Results: The preliminary phytochemical investigation of EETI seed indicated the presence of alkaloids, flavonoids, carbohydrates, glycosides, and tannins phytoconstituents. Acute toxicity test was investigated and performed the antidiarrheal activity in albino Wistar rats. EETI indicated neither any toxic effect nor mortality in albino Wistar rats up to the 2000 mg/kg, p.o. dose for 48 h and then up to 14 days. EETI seed showed a significantly antidiarrheal activity 78.23% at a dose of 400 mg/kg, p.o. in comparison to control group in the castor oil induced diarrhea in albino Wistar rats. Phytochemical investigation indicated the existence of flavonoids and tannins in the EETI, so the possible mechanism for the reduction of diarrheal episode may be due to the presence of these contents of the extract. Conclusions: It was concluded that the significant antidiarrheal activity have been shown by EETI seeds. EETI played a significant role in the management of diarrhea.

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In vitro cytotoxicity of chromatographic elutes of Calotropis procera (Ait.) R Br. leaves against human hepatoma cell line (HEPG2)

May 2016 · Indian Drugs 53(5):48-52

Authors:

Yogesh Murti
GLA University

Abstract

Calotropis procera (Ait.) R. Br. leaves extract was prepared by maceration with using a ethanol as a solvent for seven days. The dried residue was dissolved in water and partitioned with n-butanol to obtained water and n-butanol fraction. The n-butanol fraction collected was subjected to column chromatography. Chloroform, chloroform:methanol (9:1), chloroform:methanol (7:1), chloroform:methanol (1:1) and methanol elutes of n-butanol fraction of ethanolic extract of Calotropis procera (Ait) R.Br. leaves were tested against human hepatoma cell line (HEPG2) by using SRB assay method of in-vitro anticancer activity.

IN-VITRO CYTOTOXICITY OF CHROMATOGRAPHIC ELUTES OF *CALOTROPIS PROCERA* (AIT.) R BR. LEAVES AGAINST HUMAN HEPATOMA CELL LINE (HEPG2)

Murti Y*., Sharma S. and Mishra P.

(Received 12 September 2015) (Accepted 30 March 2015)

ABSTRACT

Calotropis procera (Ait.) R. Br. leaves extract was prepared by maceration with using a ethanol a a solvent for seven days. The dried residue was dissolved in water and partitioned with *n*-butanc to obtained water and *n*-butanol fraction. The *n*-butanol fraction collected was subjected to colum chromatography. Chloroform, chloroform:methanol (9:1), chloroform:methanol (7:1), chloroform:methanc (1:1) and methanol elutes of *n*-butanol fraction of ethanolic extract of *Calotropis procera* (Ait) R.B leaves were tested against human hepatoma cell line (HEPG2) by using SRB assay method of *in-vitr*

Synthesis and Evaluation of Flavanones as Anticancer Agents

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Murti and Mishra: Flavanones as Anticancer Agents

A few flavanones were synthesised by cyclisation of corresponding 3-(heteroaryl)-1(2-hydroxyphenyl) prop-2-en-1-one with sodium acetate in alcohol–water and evaluated for activity. Synthesised compounds were assayed for their *in vitro* anticancer activity against three human cancer cell lines, mammary adenocarcinoma (MCF7), human colon adenocarcinoma (HT29) and human kidney adenocarcinoma (A498) using sulforhodamine B dye. Results indicated that most of the compounds exhibited significant *in vitro* anticancer potential. Among them, compound having furan ring showed most potent activity against all the tested cell lines.

Key words: Flavanone, chalcone, anticancer activity, SRB dye, MCF7, HT29, A498

Flavanones (2-phenylchroman-4-ones) are a class of natural product that show extensive biological activities with low toxicity. Compounds with promising activity can be used as leads for synthesis of novel compounds with high efficacy and low side effects to improve drug therapy. Synthetic flavanones have attracted considerable attention because of their various pharmacological properties including antifungal[1,2], antibacterial[1,3,4], analgesic[4], antioxidant[4], vasorelaxant[5], AChE inhibitory[6] and antiVSMCs vegetation[7] activity. Flavanones have been a potential source in the search for lead compounds so investigation of synthetic routes and chemical modification is a new direction in flavanone research. Flavanones have been reported as a potent anticancer agent[8-14] also, but there were very few literature that reported the bioactivity of heteroaryl derivatives, which prompted us to synthesise a novel series of flavanones to investigate the effect by changing the B ring (fig. 1) to a heterocycle ring on *in vitro* anticancer activity. We herein, report the synthesis and evaluation of flavanones. The first step was Claisen–Schmidt reaction between heterocyclic benzaldehyde and 2-hydroxy acetophenone to form 2-hydroxy chalcone derivatives, which on intramolecular addition reaction, gave flavanone derivatives as shown in Scheme 1. The structures of target compounds are described in Scheme 2.

All the chemicals used for the synthesis of the compounds were obtained from Merck Ltd., Mumbai

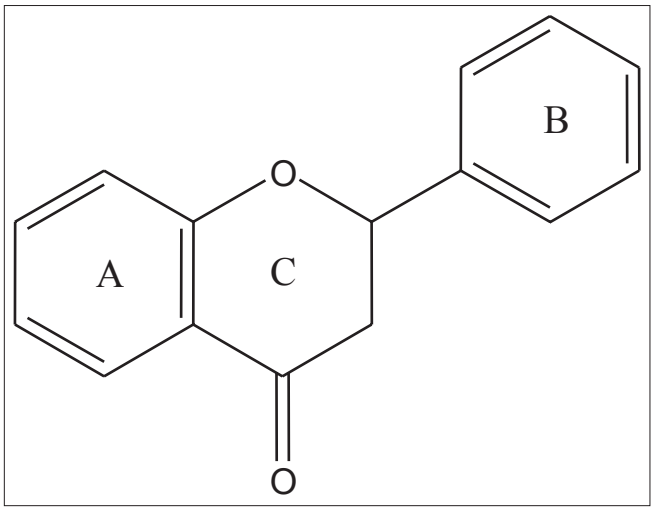

Fig. 1: Flavanone (2-phenylchroman-4-one).

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Dr. Prabhat Kumar Upadhyay

Benzimidazole: An Overview

Authors Rituparna Palit, Rajesh Kumar, Nikita Sarswat, Ankita Wal, Prabhat Kumar Upadhyaya

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Description Benzimidazole derivatives are versatile nitrogen containing heterocyclic compounds which have long been known as a promising class of biologically active compounds possessing wide variety of biological and pharmacological activities like antibacterial, anti-inflammatory, anti-ulcer, anti-diabetic etc. Scientists have elucidated that Benzimidazole system possesses the variable sites like position 2 and 5 which can be suitably modified to yield potent therapeutic agents. The present review covers the chemistry and pharmacological activities of substituted bezimidazoles. Keywords: Benzimidazole, anti-fungal, anti-histaminic, anti-convulsant, anti-inflammatory, analgesic, anti-viral, anti-oxidant, anti-cancer and anti-ulcerative.

Development of ibuprofen nanoliposome for transdermal delivery: Physical characterization, in vitro/in vivo studies , and anti-inflammatory activity

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Assessment of factors for e-learning: an empirical investigation

Vivek Agrawal, Akash Agrawal and Sucheta Agarwal

Vivek Agrawal is an Assistant Professor at the GLA University, Mathura, India.
Akash Agrawal is based at Quality Council of India, Delhi, India.
Sucheta Agarwal is a Research Scholar at the Indian Institute of Technology, Roorkee, India.

Abstract

Purpose – *The growth of internet, cloud technology, and mobile usage in the present scenario has spread in every aspect of human life. The usage of e-learning (electronic-learning) has been stretching wings in every sector and creating many opportunities. The education market has significantly developed over the past few years and e-learning has emerged as a major contributor toward the development of the education sector. The purpose of this paper is to study the perception of students of different universities in Uttar Pradesh and National Capital Region (India) toward e-learning usage.*

Design/methodology/approach – *With the help of exploratory factor analysis followed by confirmatory factor analysis, factors of e-learning were explored through a survey of 298 students involved in the e-learning process.*

Findings – *Six factors were explored and validated. These six factors are: supportive factors, system quality, learners' perspective, instructor perspective, information quality, and service quality.*

Practical implications – *Policymakers and future researchers need to focus on the facilitation of e-learning in rural and urban areas of India.*

Originality/value – *Results will be useful in the implementation of e-learning applications.*

Keywords *Education, e-Learning, India, Universities, Factor analysis*

Paper type *Research paper*

Introduction

According to Horton (2000), e-learning represents a significant change in the manner humans have carried out training from the time the chalkboard or probably the alphabet was invented. Advancements in computers and electronic communications have narrowed spatial and temporal barriers; today, knowledge can be obtained and delivered as and when desired. The emergence of e-learning symbolizes a new pattern in and transformation of advanced education as we know it (Gunasekaran *et al.*, 2002; Sun *et al.,* 2008). Indeed, e-learning tools are being used widely by universities and companies in various learning programs and educational activities (Kanuka and Anderson, 2007). Distance education is another area which has been significantly influenced by the emergence of e-learning (Hassanzadeh *et al.*, 2012). Online tutorials, essays, explanations, and easy access to information have made it easier to gain knowledge on any topic. In fact, it has become almost normal for learners to contact teachers/experts at distances far away through e-mail or Skype, and learn from them. The advent of smart phones has also facilitated the e-learning process. It can be said that today, e-learning has become an essential supplement to traditional learning practices. The Government of India has also recognized the potential of this medium and taken initiatives such as E-Gyankosh, National Open and Distance Learners' Library and Information Network, etc., to encourage and empower learners.

While some researchers have focussed on the technical components of e-learning systems (Islas *et al.,* 2007), others have stressed only the related human factor considering instructor and student satisfaction (Liaw *et al.,* 2007). Douglas and Van Der Vyver (2004) discussed the usefulness of e-learning course material only. Arbaugh and Fich (2007) on the other hand,

Consumer preference for electronic consumer durable goods in India: a conjoint analysis approach

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Abstract: The second highest population of consumers with different wants and preferences, India is a place where MNCs have ample opportunities to cater variety of products. The purpose of this paper is to examine the Indian consumers' decision making regarding consumer durable goods i.e., split air-conditioner on the basis of several factors like brand equity, price, advertisement type, celebrity, country-of-origin under multi cue situation. In this study, firstly the evaluation is made about the impact of perceived difference among brand equity, price, advertisement, celebrity endorsement and country of origin on product preference. Secondly the relative importance of these attributes is being determined using part-worth analysis. Five relevant research questions were framed and tested. An orthogonal design was used to develop different product profiles which respondents could evaluate.

Keywords: India; economy; consumer preference; purchase decision; brand; price; celebrity endorsement; advertisement; country of origin; marketers; consumer durables; electronic market; conjoint analysis; orthogonal design; part worth; utility estimate; relative importance.

Reference to this paper should be made as follows: Kulshreshtha, K., Bajpai, N. and Tripathi, V. (2017) 'Consumer preference for electronic consumer durable goods in India: a conjoint analysis approach', *Int. J. Business Forecasting and Marketing Intelligence*, Vol. 3, No. 1, pp.13–37.

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Intention to Purchase Hybrid Cars in India : A Study

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Abstract

This study aimed to measure consumer purchase intention of hybrid cars in India and discussed various factors and previous studies associated with purchase intention of hybrid cars in different nations. The results serve as a reference for automobile companies planning to launch hybrid cars in the near future in India. Five different constructs were extracted from literature for measuring intention to purchase hybrid cars in India, including seeking green products information, self image effects, social value of hybrid car purchase, emissions importance, and social value of green product purchases that is associated with owning a hybrid car in India. Partial least square structural equation modeling was incorporated to establish the relationship model. The results indicate that Indian consumers showed relatively high purchase intention towards hybrid cars. Our analysis found that seeking green product information, social value of hybrid car purchase, and social value of green product purchase is positively associated with hybrid car purchase intention among Indian consumers. However, self image effects and emission importance emerge to be negatively associated with hybrid car purchase intention. Indian consumers are yet to warm up to the idea of purchasing eco friendly cars known as hybrid cars, and it takes a long time to create awareness among Indian consumers towards the advantages of accepting hybrid cars. This study would be helpful for the automobile sector to better understand the various dimensions needed for developing a positive intention towards hybrid cars.

Keywords

Purchase Intention, Hybrid Car, Green Marketing, Decision Making

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WORKPLACE DIVERSITY AND INCLUSION: COMPLIANCE TO EXIGENCY

Aneesya Panicker*

Abstract: Globalization led tremendous movement of people around the world, resulting into vociferous discussion at the international forums on issues of immigration, assimilation, adjustment and the politics behind and associated with them. Diversity and inclusion has become a sensitive issue today. Workplace in forms are microcosm of a nation, reflecting numerous types of people on the basis of ethnicity, caste, religion, gender, race, sexual orientation, all directed towards a common goal and working under one association. However, we can't say our workplaces truly reflect the salient composition of our country or society we are living in? Successful organizations will be those who are able to imbibe and promote workforce diversity through workforce inclusion. The present paper investigates the significance of inclusion on workforce diversity leading to organizational excellence in the light of previous researches done. The study reveals that various dimensions of diversity are linked with organizational performance in different way. Furthermore, it offers a conceptual framework that reflect the integration of inclusion and diversity for organizational excellence on the basis of available literature that will facilitate the industry practitioners and scholars to devise such diversity initiatives and inclusive practices which will lead to organizational excellence.

Keywords: Workforce diversity, inclusion, organizational excellence, conceptual framework.

INTRODUCTION

Being a part of this Globalized era it is almost inevitable for organizations to resist mobility of workforce. Thus, attracting and retaining the best available human resource talent is the need of the hour (Sharma and Agrawal, 2012). Managers often use to raise a question regarding the significance of managing diversity and as such the impact it has over the organizational performance (Jackson and Joshi, 2004). Every organization desires to excel in their respective field which requires them to be agile in terms of people management in terms of acquainting and making them skilled in, dealing with diversified workforce and believe in the sanctity of inclusion. An organization with diversified workforce if fostered with an inclusive culture tends to make the organization more novel, swift, and in sync with customer's needs and wants. It is observed that annually organizations invest billions of dollars approximately eight billion on managing diversified workforce (Hansen, 2003). From the last few decades, organizations have shifted their focus of efforts from diversity to inclusion. As per the survey carried by the Society for Human Resource Management and Fortune magazine during 2001, approximately 75% of the organizations were involved in one and another form of diversity initiatives and practices.

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