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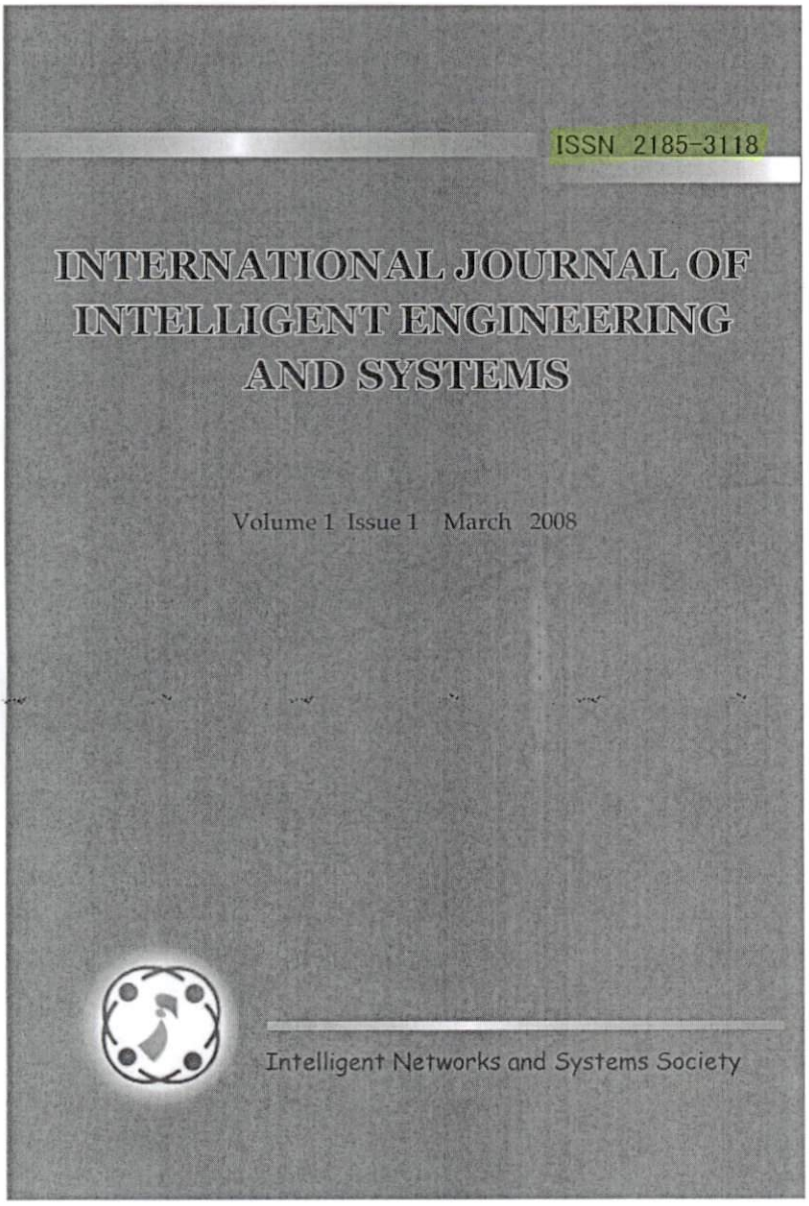

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Multifocus Color Image Fusion Based on Walsh Hadamard Transform and Sum-Modified-Laplacian Focus Measure

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Abstract: Multi-focus image fusion objective is to add relevant information from multiple images of the same scene but with different focuses into a sharper image that is more suitable for visual sensor networks. Natural and artificially obtained multifocus color images are considered for fusion. The existing fusion methods like multi scale and multi-resolution transforms are proved to be good in Multi-focus Image Fusion. However, they suffer from computational complexity in kernels calculation. In this paper, Multi-focus color Image Fusion based on Walsh-Hadamard Transform and sum-modified-Laplacian focus measure is proposed. Walsh-Hadamard Transform is a non-sinusoidal, orthogonal transform with symmetry, seperability and orthogonal properties. These properties make it more apt for image fusion than other transforms. And the sum-modified-Laplacian focus measure helps to get sharper image. Proposed method performance is evaluated in terms of reference and non-reference measures. The experimental results indicate that proposed method not only produces sharp details in fused image but also reduces the computational complexity.

Keywords: Walsh Hadamard transform, Multi-focus color image fusion, Sum-modified-Laplacian focus measure.

1. Introduction

In visual sensor networks, it became difficult to derive an image with all important objects in focus due to the restricted depth of focus of optical lenses in charge coupled devices (CCD) imagers. The solution to this is multi-focus image fusion, which adds multiple images of diverse focusing levels of the same scene into a sharper image which is more apt for visualization and detection. Multifocus image fusion has several applications in the areas of electronic circuit design and inspection, defence, computer vision, visual sensor networks and surveillance.

The multi-focus image fusion algorithms are classified into spatial and transform domain fusion methods. The spatial domain techniques [1, 2] use local spatial features such as gradient, spatial frequency, and standard derivation to fuse source images. However, the spatial domain techniques introduce undesirable effects such as image blurring and contrast reduction. For the transform domain methods, source images are projected onto localized bases which are generally made to denote the sharpness and edges of an image. In literature, various transform domain techniques involving multi scale decomposition were developed like Laplacian pyramid [3], Contrast and Gradient pyramids [4 - 6], principle component analysis (PCA) [7], multi-resolution transform methods such as multi-resolution singular value decomposition (MSVD) [8], discrete wavelet transform (DWT) [9], stationary wavelet transform (SWT) [10], lifting stationary wavelet transform (LSWT) [11], Daubechies complex wavelet transform (DCWT) [12], Shearlet Transform (ST) [13], double density discrete wavelet transform (DDDWT) [14] and discrete cosine harmonic wavelet transform (DCHWT) [15]. The major problem with pyramid based methods in [3-6] is lack of spatial orientation selectivity, which results in blocking effect in the fused image. PCA based method in [7] acquaint

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Strengthening of Reinforced Concrete Rectangular Columns by using FRP Sheets

P Urmila, A S Kumar, A L P Kumar, N Haripavan

ABSTRACT: Strengthening of columns is needed now a days because of various reasons. Upgrading existing strength of columns, rectifying inadequacies due to poor construction practices or due to degradation or due to environmental effects are may be some reasons.

In the present study the strength behavior of RC short axially loaded columns(100x00x500) strengthened with FRP sheet strips and the effect of edge rounding (sharp edges are made round) on load carrying capacity are studied. The Column is wrapped with strips of different FRP sheets at different spacings of constant FRP sheet material area. Columns are reinforced with 4#10mm diameter steel bars. The columns are designatedas CC,SG83.33,SG50,SB83.33,SB50,SC83.33,SC50,RG83.33,RG50, RB83.33,RB50,RC83.33,RB50. Here CC column is of control column without FRP sheet sticked S stands for sharp edge columns. R stands for rounded edge columns .G,B and C stands for Glass, Basalt, Carbon FRP sheets respectively. Here numerical indicates the width of the FRP strips in mm. The percentage increase in the capacity (load) of FRP strengthened columns compared with control column(CC) For SG83.33 is 20.7% ,for SG50 is 49.1% , for SB83.33 is 6.7% , for SB50 is 13.3%, for SC83.33 is 29.49% ,for SC50 is 65% , for RG83.33 is 43.1% , for RG50 is 63.33% ,for RB83.33 is 24.9% ,for RB50 is 40.3%, for RC83.33 is 54.85% ,for RC50 is 67.26%.

Keywords:-FRP, CC Column, Strengthening, Number of Wrap

1. INTRODUCTION

The maintenance and rehabilitation by means ofstrengthening of the existing structures is one of the major problem of present day civil engineering practices. This is because, many structures which were constructed earlier with then design codes throughout the world are structurally not safe when checked with the present code of practices. Since the replacement of the structural members which are not safe involves a lot of economy and time. So retrofitting of the structural members by means of strengthening the existing members is the best way of improving the capacity(load) and the service life of the structure. Infrastructural damage of the structure by the premature deteriorations resulted in the initiation of the investigation of several repairing and strengthening processes of the existing structures. Strengthening of concrete structures put upon a challenge in selecting the appropriate method which will enhance the strength and service life of the structure with limitations of constructability, type of building operations and the economy involved. Improving the strength of the structure is required depending on the situation and the need for instance, additional strength may be needed to increase the capacity of structure in terms of load. This is generally required when there is change in purpose of the structure or higher capacity(load) is required. This change in purpose of a structure comes into play when additional mechanical equipment, construction equipment are required to place on the structure.

Strengthening of a structure is required when there is a need to resist additional imposed loads that were not considered in actual design. This is possible when a structure a subjected to some unexpected loads like wind load, earthquake force etc., which act in the lateral direction with very high intensities, in such situations strengthening is required.

Additional Strength is required as there is deficiency in the structure to carry the design loads. The possible deficiencies include the deterioration of members by corrosion, spalling of the concrete, damage due to the vehicular impact, excessive loading, fire, damage caused by the errors in building without following the actual proposed design.

Natural disasters like earthquakes, tsunamis, cyclones, etc., resulting a lot of disturbance to the infrastructural design and the service life of the structures. The majority of the reinforced concrete buildings and bridges constructed in India before 1970s typically does not have the required capacity (load) to resist the such above disasters. In order ensure the the structural safety efficient methods to be developed for structural repair and strengthing. For this FRP strengthening is one of the essential requirement among different strengthening techniques.

1.1 STRENGTHENING TEQNIQUES FOR RC COLUMNS

- Jacketing of Concrete
- Jacketing using Steel
- Concrete Jacketing (Precast)
- External Pre-stressing
- Wrapping a column with a high strength fibre reinforced polymer(FRP) composites

1.2 INTRODUCTION TO FIBER REINFORCED POLYMERS (FRP)

Fiber Reinforced Plastics (FRP)is well known generic term, which is used to define a versatile composites family which is being used in all types of industries like chemical plants, power plants, luxury power boats etc. The structure of the FRP is very typical which consists of an unsaturated

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Evaluation of Drainage and Surface Water Resources of Brahmayyalingam Lake in Agiripalli Mandal, Krishna District, A.P., India Using Geo-Spatial Technologies

G.T.N.Veerendra, A.V. Phani Manoj, Adari Satish Kumar, Pallepamula Urmila

ABSTRACT--- The water assets preservation and management assumes an essential part in the financial advancement of a country. In view of water need and the idea of improvement of water assets on watershed evidence has picked up significantly over the most recent two decades. The expanding request set on them has empowered examinations, situated towards the assessment of the assets, which is the reason for the detailing of plans for its investigation, administration, and preservation. The protection, improvement, and administration of surface water assets raise the generation level and maintain the same, it is conceivable through watershed-based projects. The Brahmayyalingam Lake is the geohydrological framework is a vital piece of Budameeru waterway of Kolleru basin. It is exceptionally impossible to miss to take note of that this geohydrological structure is subjecting to visit flooding amid rainstorm and intense water shortage issues amid whatever remains of the year. The principal target of the present paper is to create spatial data on water and surface water assets in Brahmayyalingam lake watershed. Geospatial advancements that incorporate Remote sensing and GIS will be utilized for creating data base on water and surface water bodies, the required information consolidates satellite pictures and other subordinate information as Survey of India (SOI) toposheets, reports, small scale maps, ground truth/field information and so forth.

Index Terms—
GIS - Geographical Information Systems, SOI- Survey of India, SRTM - Shuttle Radar Terrain Mapper

I. INTRODUCTION

According to recent studies it was identified that, globally, natural resources are going under severe threaten the present circumstances [Bronmark.C et.al, 2002]. The increasing anthropogenic activities pose severe pressure on various natural resources, together with forest and water resources [Bonell.M et.al, 2004]. The running down of these resources have an impact on micro climate state of region transforming the existing natural landscapes into undesirable land structures unsuitable for use [Hofer.T et.al,1993].The fall and loss of water storage potentialities like tanks, canals etc., are at the same rate at which forests are dishonored since water is noted as the crucial & critical constituent necessary for individual utilization also with agricultural usage, safety, management and protection of these assets are decisive for the sustainability of habitants .[Johnson et.al,2001].

1.1 Remote Sensing:

Remote sensing is the acquiring of information about an surface object without having physical contact with the object and thus in difference to on site study.

PROCESS OF RS

Remote sensing is another category of geography. In present technology usage, the term generally refers to the use of above ground sensor technologies to spot and categorize objects on Earth by means of disseminated signals (e.g. EMR). It may be split into active remote or passive (e.g. sunlight) when information is purely witnessed.

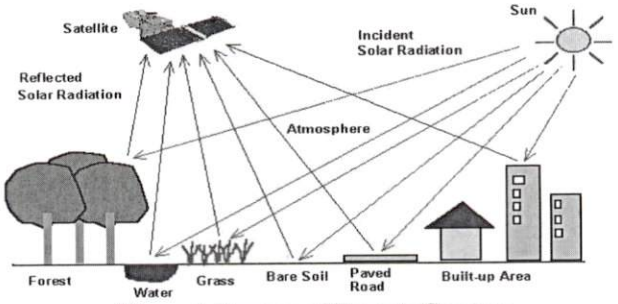

Figure 1 Process of Remote Sensors

Passive sensors assemble radiation that is emitted or reflected by the entity or neighbouring vicinity's. Reflected sunlight is the most familiar resource of radiation measured by the sensors, examples consist of infrared and radiometers.

1.2 Geographic Information System:

A GIS is an automated based tool for mapping and evaluating features on earth. GIS innovation amalgamates across the board database methods, for example, enquiry and factual examination, with maps. GIS oversees area based data and gives instruments to show and examination of different measurements, including populace qualities, monetary advancement openings, and vegetation composes. GIS enables you to connect databases and maps to make dynamic showcases. Additionally, it provides tools to visualize, certainty, and overlay of those databases in certain ways that are not possible with conventional spreadsheets. These abilities differentiate GIS from other information systems, and make it valuable to an extensive choice of

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Assessment of Godavari River Water Quality in and Around Rajamahendravaram

P.Lakshmi

Abstract: Surface water is by far the most important nutrient for the human body next to oxygen. Rivers plays an important role in the development of our country and sustenance of life, which are being polluted due to development activities like rapid industrialization, urbanization, etc. The main objective of this work is to analyse and classify water quality of river Godavari in and around Rajamahendravaram in order to determine the degree of pollution and ascertain the required treatment level before usage. The samples are collected from Pushkarghat, Gowthami ghat, Kovvur, Katheru, Katheru oxidation ponds integrated samples from top to bottom in the middle of river. Parameters of the Godavari river water determined include pH, ammonia, total dissolved solids (TDS), turbidity, total alkalinity, salinity, total hardness, electrical conductivity,etc. using both in in-situ and standard laboratory procedures. The samples are analysed, then results of the water parameters are compared with the prescribed Pollution Control Board standards. If the parameters are exceeding the prescribed standards then suitable methods of treatment are suggested for the eradication or minimization of pollution. From the present study we came to know that Turbidity, Total Alkalinity, Total Hardness, Calcium, Magnesium, Iron, Ammonia parameters are found to be in excess. So treatment methods like coagulation followed by Flocculation, Softening techniques like lime soda process and reverse osmosis, Oxidation ponds, De-nitrification techniques are used in order to preserve the quality of the river water for Drinking, Industrial and Agricultural purposes. Based on the Water Quality Index(WQI) calculated for the samples, it is found that Sample 3 (WQI-17.84) can be classified as 'Excellent' quality of water to be used for drinking, irrigation and industrial consumption. Sample 1 (WQI-32.43) & Sample 2 (WQI-28.63) can be designated as 'Good 'quality' of water which can be used for various above said purposes. Coming to Sample 4 (WQI-205.4) - the various parameters concentration is beyond the permissible limits specified by IS-10500 as well as CPCB and is classified as water 'unfit for human consumption'. Sample 5(WQI-70.93) - in spite of treatment measures taken by the industry, it is designated as water is'Fair' in quality and still needs to be treated carefully to bring down the concentration of various parameters within the concentration of limits and make it suitable for consumption. In order to observe the effect of pollutants in the sample-5 (WQI=70.93) on growth of plants and in order to know the extent of care taken by paper mill to remove pollutants, growth in a small plant is observed by watering the potted plant continuously for 15 days with the treated effluent. The plant is observed to show the normal growth indicating that the industrial management is taking care of the treatment of the effluent waste water. Finally, it is observed that in the study area, the impact of human activities on the river is existing even though the magnitude may be less, there is a danger in the near future, if proper care is not taken by respective authorities.

Index Terms: Analyse, Degree of Pollution, Treatment, Water Quality Index

I. INTRODUCTION

The quality of drinking water is an environmental determinant of health. Drinking-water quality management has been key work for over 150 years and it continuous to be the foundation of prevention and control of waterborne diseases. Safe drinking-water, as defined by the Guidelines, does not represent any significant risk to health over a lifetime of consumption. The nature and form of drinking-water standards may vary among countries and regions. There is no single approach that is universally applicable. It is essential in the development and implementation of standards that the current or planned legislation relating to water, health and local government is taken into account and that the capacity of regulators in the country is assessed. The main objective of this study is to assess and characterize the quality of Godavari river water in and around Rajamahendravaram Municipal water supply.

By collecting the samples from different locations and analysing the various parameters in the laboratory, the impact of human activities on the quality of water can be identified. The results of analysis are compared with IS standards and the quality of water is classified at various points of Godavari River. The River Godavari is the second largest river in the Indian Union. Starting from a trickle from the lips of a cow at Triambak, the width of the river grows till it is nearly 6.5km wide at Dowleswaram. It is always spoken of as the Southern Ganga and Vriddha Ganga. At Papikonda, it is narrow as 200-300 m for about 3 km. The Godavari rises in the Western Ghats at Triambak near Nasik, about 113 km northeast of Bombay and only 80 km from the Arabian Sea. After descending the Western Ghats, it takes a south easterly course across the southern part of Indian peninsula and flows through 1,230 km and falls into the Bay of Bengal about 80km east of Rajahmundry. The total catchment area drained by the river is 312,812 km, or nearly one tenth of India. The catchment in Maharashtra is about 152,199 km. The average annual flow (50% dependable flow) of the Godavari basin has been estimated as 110.5 km., whereas the utilizable flow (75% dependable flow) is about 76.3 km. The present utilization is only about 39 km3, which is hardly 50%. The annual rainfalls are moderate, from 700 mm at Nasik to 1,000 mm at Nizamabad.

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Nonlinear transient analysis of delaminated curved composite structure under blast/pulse load

Chetan Kumar Hirwani & Subrata Kumar Panda

Engineering with Computers **36**, 1201–1214 (2020)

Abstract

The nonlinear time-dependent displacement values of the curved (single/doubly) composite debonded shell structure are examined under different kinds of pulse loading in this research. The structural curved panel model is derived mathematically using the higher-order displacement theories containing the thickness stretching effect, whereas the sub-laminate approach is adopted for the inclusion of delamination between the subsequent layers. The structural geometry distortion under variable loading has been included in the current theoretical analysis through Green–Lagrange type of strain kinematics. Further, the governing differential equation order has been reduced with the help of 2D finite element formulation via the nine-noded isoparametric Lagrangian elements with variable degrees of freedom (eighty-one and ninety) for two different

Original Article | Published: 05 August 2019

Optimal deflection and stacking sequence prediction of curved composite structure using hybrid (FEM and soft computing) technique

Nitin Sharma, Anil K. Lalepalli, Chetan K. Hirwani, Arijit Das, Subrata K. Panda, Umut Topal & Tayfun Dede

Engineering with Computers **37**, 477–487 (2021)

Abstract

The bending deflections and the corresponding optimal fiber angle sequences of the subsequent layers have been predicted in this article using a hybrid technique. The structural static responses are computed numerically via the isoparametric finite element steps in association with Reddy's higher order mid-plane theory. The final stacking sequences of individual layers are further predicted through two types of soft computing techniques (particle swarm optimization, PSO; teaching–learning-based optimization, TLBO). The responses (deflection and optimal angle) are obtained via a customized computer code (MATLAB) using the current mathematical model in association with two different optimization algorithms. The accuracy of the currently derived higher order hybrid model is established by conducting a few numerical

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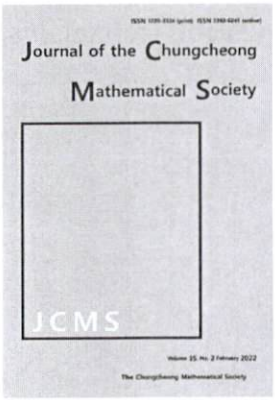

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CLOSED AND DENSE ELEMENTS OF BE-ALGEBRAS

M.Bala Prabhakar*, S.Kalesha Vali**, and M. Sambasiva Rao.***

Abstract. The notions of closed elements and dense elements are introduced in BE-algebras. Characterization theorems of closed elements and closed filters are obtained. The notion of dense elements is introduced in BE-algebras. Dense BE-algebras are characterized with the help of maximal filters and congruences. The concept of D-filters is introduced in BE-algebras. A set of equivalent conditions is derived for every D-filter to become a closed filter.

1. Introduction

The notion of BE-algebras was introduced and extensively studied by H.S. Kim and Y.H. Kim in [5]. These classes of BE-algebras were introduced as a generalization of the class of BCK-algebras by K. Iseki and S. Tanaka [4]. Some properties of filters of BE-algebras were studied by S.S. Ahn and Y.H. Kim in [1] and by J.L. Meng in [6]. In [10], A. Walendziak discussed some relationships between congruence relations and normal filters of a BE-algebra. In [3], Gispert and Torrens defined the Boolean center and the Boolean skeleton of a bounded BCK-algebra and they used the Boolean skeleton to obtain a representation of bounded BCK-algebras. In [7], C. Muresan studied some properties of dense elements and the radical of residuated lattices. Later in 2011, D. Piciu and D. Tascau [8] developed a theory of localization for bounded commutative BCK-algebras.
In this paper, the notions of closed elements is introduced in BE-algebras. A set of equivalent conditions is derived for every element of a BE-algebra to become closed. The notion of closed filters is introduced in BE-algebras. Closed filters are characterized in terms of closed elements

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Constrained Optimization of Linear Antenna Arrays using Novel Social Group Optimization Algorithm

Jyothi Budida, Sanjai Kumar Mortha, Sreerama Lakshmi Narayana

Abstract: *Antenna array optimization is a major research problem in the field of electromagnetic and antenna engineering. The optimization typically involves in handling several radiation parameters like Sidelobe level (SL) and beamwidth (BW). In this paper, the linear antenna array (LAA) configuration is considered with symmetrical distribution of excitation and special distribution. The objective of the design problem considered involves in generating optimized patterns in terms of SLL and BW and check the robustness of the social group optimization algorithm (SGOA). The analysis of the design problem is carried out in terms of radiation pattern plots. The simulation is carried out in Matlab.*

Keywords: *Antenna array, optimization, SGOA*

I. INTRODUCTION

The antenna array configuration (AAC) has several advantages over single element antenna. It is possible to obtain high gain and directivity using AAC. It is also possible to direct the beam to any direction of interest using the AAC [1-6]. In addition to beam steering capabilities, it is also possible to shape the radiation pattern in the desired form in order to compete with several applications. Some of the typical applications are the RADAR, cellular and mobile, and several other personal communication systems. All these applications need a variety of radiation patterns which are generally not possible with the single element antenna configuration. Hence, the AAC is preferred to solve such electromagnetic problems. The AAC can be of several geometrical forms like linear, planar as one dimensional and two dimensional respectively along with three dimensional structures. The synthesis of antenna arrays is an optimization problem as it involves in handling several conflicting parameters of antenna arrays which have to either minimised or maximised [2]. This minimisation or maximization of antenna parameters in the presence of some constraints is always a challenging problem since the inception of the AAC. Several conventional and highly complex numerical methods are suggested to handle the synthesis problem. However, all the conventional problems are typically local search methods. They often have the tendency to give local optimization solution rather than global competent solution [2,4,5]. Considering the above issues with conventional and traditional numerical methods, several evolutionary computing algorithms are proposed to antenna array optimization (AAO) problems.

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Earlier the most famous genetic algorithm, Taguchi method, and particle swarm optimization algorithms are applied successfully to produce optimum sidelobe level (SL) with several constraints. In the recent past, several nature inspired algorithms like flower pollination, firefly, ant colony and bacterial foraging are applied to AAO problems. All the algorithms have produced excellent solutions to the AAO problems. In this paper, a more recent algorithm known as social group optimization algorithm (SGOA) is used for AAO and design. The algorithm is applied to linear array optimization using amplitude-spacing (AmpSp) technique. Further, the paper is written in four Sections. The Section-2 gives a brief introduction to the problem formulation and the description of the algorithm is given in Section-3. The results and discussions are mentioned in Section-4. Overall conclusions of the work are presented in Section 5.

II. PROBLEM FORMULATION

The geometrical representation of the structure of the linear array is given in Fig.1. The presented geometry of the linear array has a symmetrical structure. According to the symmetry the linear array has similar distribution of amplitudes of current excitation and spacing between the elements on either sides of the array.

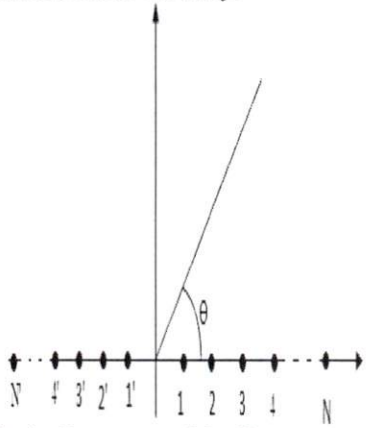

Fig 1: Geometry of the linear array

The formulation of the array factor is given as [1]

$$AF = \sum_{:0}^{1} e^{jm\psi} \quad \sum_{:0}^{1} e^{jm\psi} \qquad (1)$$

Here

$$\psi = \beta d\cos\theta + \alpha$$

and $\beta = 2\pi/d$

d= inter-element spacing

θ=look angle

α= phase

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Heat transfer augmentation techniques in forced flow V-trough solar collector equipped with V-cut and square cut twisted tape

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Highlights

- The forced flow V trough solar collector are investigated using square cut and v cut twisted tape inserts.
- The heat transfer rate of V trough collector is 8.4% higher than flat plate collector.
- The performance of v cut twisted tape inserts with twist ratio 3 is better than the twist ratio 5.
- Empirical correlations are developed based on the experimental results.

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Integrated features and GMM Based Hand Detector Applied to Character Recognition System under Practical Conditions

Songhita Misra & R. H. Laskar

Multimedia Tools and Applications **78**, 34927–34961 (2019)

Abstract

Detection of bare-hand under non-ideal conditions is a challenging task. Most of the existing hand detection systems are developed under limited environmental constraints. In this study, a robust two-level bare-hand detector is integrated with a 58 keyboard characters recognition model. At first, the Gaussian mixture model (GMM) based foreground detector is used to segment the region of interest (ROI), which is further classified using Color-texture and texture based models to detect the actual fist. The detected hand is tracked using modified Kanade–Lucas–Tomasi (KLT) tracker to generate the required trajectory points of the character. The feature space for character recognition consists of existing features and three new features, namely, Local Geometrical Area Ratio (LGAR), Area of two

proving the authors with equipments for carrying out the research work.

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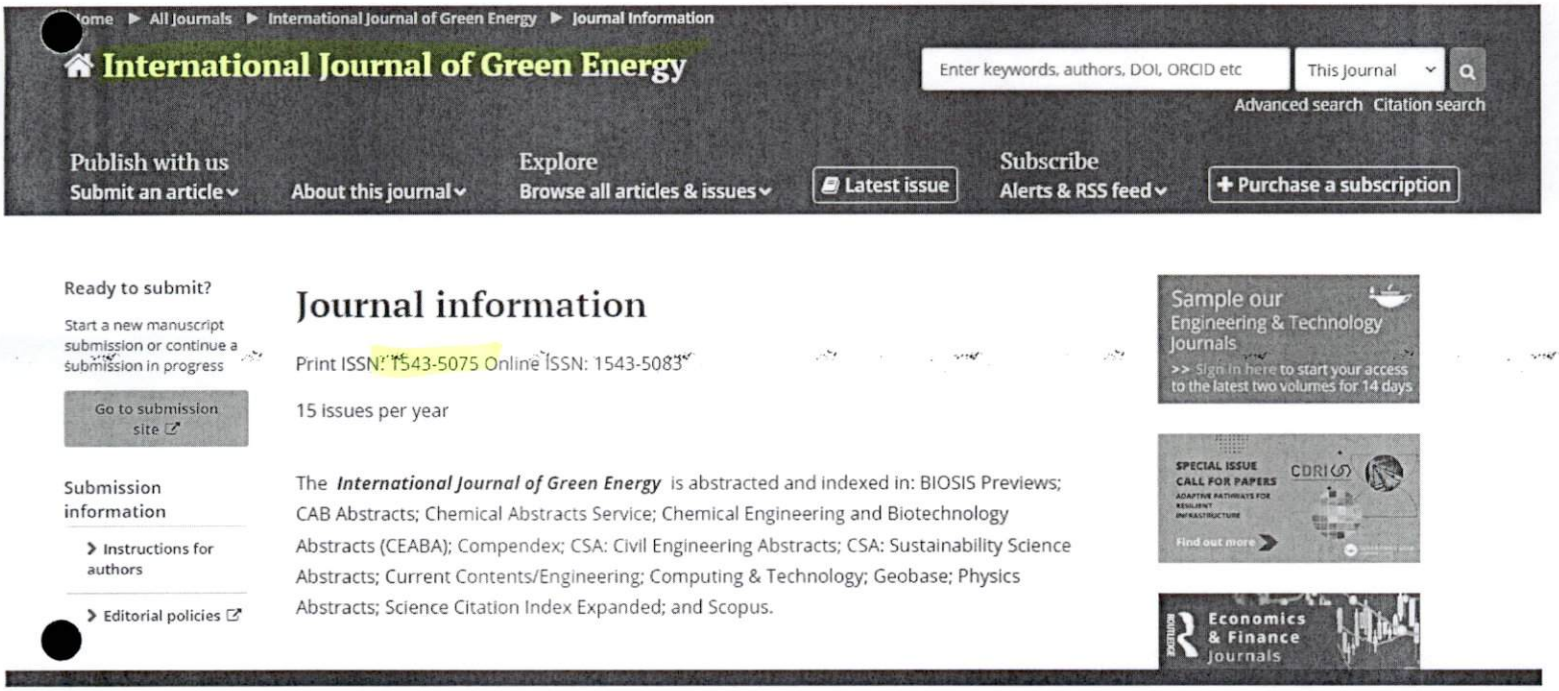

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Improving performance of a trapezoidal-trough thermosyphon solar collector using peripherally wing-cut swirl generator

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ABSTRACT

In this present study, the performance of a newly modified solar collector named trapezoidal-trough solar collector (Tra-trough) has been examined using peripherally wing-cut swirl generator (PSG). The experiment has been executed at Government College of Engineering, Salem, Tamilnadu, India (Latitude: 11°66′N and Longitude: 78°15′E) with three different wing shapes including PSG with triangular wings (PSG-Tri), rectangular wings (PSG-Rec) and trapezoidal wings (PSG-Tra). The obtained results are contrasted with plain tube Tra-trough (TT-plain) solar collector under the same working condition. The experimental trials are made by keeping swirl ratio (Y = 3), wing-span ratio (b/W = 0.3) and wing-chord ratio (d/W = 0.4) as constant. The results obtained from the TT-plain are verified with the fundamental equations and found the deviations within ±11.21% for Nusselt number and ±8.24% for friction factor. From the experimental result, the PSG provides higher heat transfer rate over the TT-plain with/without typical swirl generator (TSG). The results also exposed that the PSG with trapezoidal wings (PSG-Tra) offers higher heat transfer rate and thermal efficiency than those given by other type of wing shapes. The thermal performance of trapezoidal wings (PSG-Tra) is enhanced up to 137% over the TT-plain. In addition, correlations for predicting the Nusselt number and friction factor have been developed. The deficiency of the predicted value for Nusselt number and friction factor are within ±10.31% and ±11.21%, respectively.

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KEYWORDS
Tra-trough; peripherally wing-cut; trapezoidal wing; rectangular wing; triangular wing; typical twist

1. Introduction

Due to the scarcity of nonrenewable energy sources, the utilization of renewable energy extends day by day. Solar energy becomes the most promising source of energy than all other energy sources. This solar energy may be transformed into valuable energy either as electricity by photovoltaic cells or as heat energy by means of solar collectors and solar ponds. The solar collector's performance can be enhanced by several augmentation techniques like type of receiver, coating materials, insulation type and reflecting material, etc. The placing of twisted tapes in a flow passage is one of the simplest, lowest cost, and zero maintenance passive techniques for augmenting the convective heat transfer. In the past decades, lot of research works by both experimentally and numerically were being carried out to examine the effects of modification in twisted tape geometry in terms of Nusselt number and friction factor. When compared to heat exchangers, only a few experiments have been carried out with modified swirl generator geometry in solar collector fields.

An experiment in a horizontal double-pipe heat exchanger using conventional twisted tape has been conducted (Naphon 2006). The influences of serrated twisted tape in a circular tube under turbulent condition (Chang, Jan, and Liou 2007) have been examined to evaluate the system performance. The heat transfer properties of straight full twist insert in a tube with various spacer distances were experimentally analyzed (Krishna, Pathipaka, and Sivashanmugam 2009). An experiment has been conducted (Eiamsa-ard et al. 2009) using short-length and full-length twisted tape in a round tube. The experimental results indicated that the performance of the full-length tapes was greater than the short-length tapes. In order to enhance the rate of heat transfer (Eiamsa-ard et al. 2010), delta-winglet twisted tape was used.

The viscosity and thermal conductivity of Al_2O_3 nanofluid were determined experimentally (Syam Sundar and Sharma 2010) at various temperatures and volume concentrations. The insertion of peripherally-cut twisted tape with alternate axis (PT-A) in a uniform heat flux circular tube (Seemawute and Eiamsa-ard 2010) has been illustrated to study the heat transfer characteristic. They concluded from their results that the heat transfer rate in the tube equipped with the PT-A tape was 184% greater than that the result obtained from the plain tube. In order to augment the rate of heat transfer (Eiamsa-ard et al. 2012), helically twisted tapes (HTTs) have been used. The experiment was conducted using HTTs with three various twist ratios (2, 2.5,

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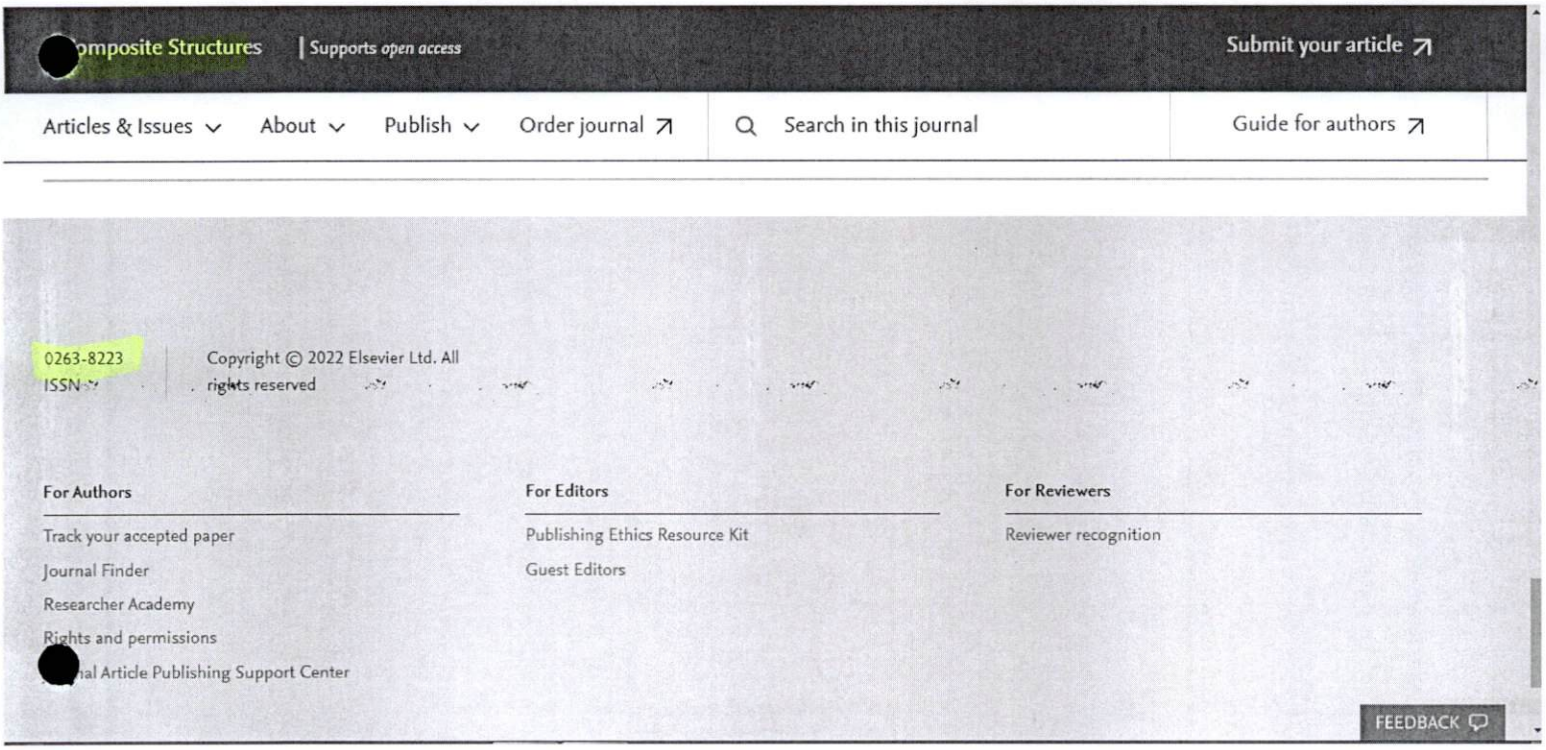

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Composite Structures

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Nonlinear thermal free vibration frequency analysis of delaminated shell panel using FEM

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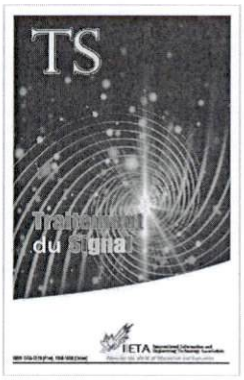
Abstract

The current research reported the thermal free vibration characteristics of the debonded composite shell structure considering the large geometrical deformation. The delaminated composite panel structural model is derived using two different higher-order polynomial kinematics. The nonlinear structural geometry has been modeled via Green-Lagrange relations in conjunction with temperature loading. The separation between the adjacent layers of the composite has been incurred through a sub-laminate approach and the corresponding displacement continuity imposed at the boundaries (laminated and delaminated). Moreover, the isoparametric Lagrangian type of element (eighty-one and ninety degrees of freedom) is adopted for the discretization of the physical shell structure. The nonlinear governing equation of motion



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Statistical Analysis of Lower and Raised Pitch Voice Signal and Its Efficiency Calculation

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acoustic feature, statistical analysis, feature extraction, SVM classifier, speaker identification

ABSTRACT

The voice signals of human are a type of acoustic signal that transfers the information about the message or word delivered in the form of speech. The speech of each person has its unique acoustic features. The statistical analysis of such features is critical to the speech recognition. Therefore, this paper aims to identify the speaker through statistical analysis of acoustic features of voice signals. First, the data collection method for speech samples was introduced, the voice signals were divided into three categories, namely, normal voice (NV), lower pitch (LP) and raised pitch (RP), and the effects of the LP and RP on speech were discussed. Then, a feature extraction method was coupled with several classifers to identify the LP and RP for speaker identification. Next, the MFCC, ΔMFCC and ΔΔMFC were adopted to extract the acoustic features. Finally, the proposed method was verified through a speaker identification experiment. The results show that our method can accurately capture the acoustic features of each speaker, and correctly differentiate between the NV, LP and RP. The research results are of great significance to speech recognition and speaker identificaiton.

1. INTRODUCTION

Speech communication is the basic mean of communication. Speaker identification in speech signal processing is a process to identify a particular person's voice for verification of identity. In the speaker, identification identifies the particular word or message who is speaking [1]. In speech signal processing, speech is classified into two categories as voice speech and unvoiced speech which depends on the vocal cords on speech in speech production technique [2]. Voiced speech produced when vocal cords inactive like /a/e/i/o/u/, unvoiced voice produced when vocal cords are inactive like /s/f/l/ these are produced only when vocal cords vibrate. Other classes of sounds are nasal sounds and plosive sounds. In this research work, the different speaker speaks the same string of words/sentences that deliver the same information but results are different in some dialect like length, pitch, frequency and oscillation [3].

In this area of research speech signal processing that includes speech coding, speaker recognition, speech analysis and synthesis, speech enhancement, etc. The most important applications of speech identification are used in the forensic department for speaker identification in the speech recognition area as illustrated in Figure 1.

This method mostly used in forensic speaker recognition in which determining individual speaker voice that is tracing in different physical moments. In the speech signals, speech recognition in different ways as for example speech recognition, language recognition and speaker recognition [4]. Speech recognition, recognize a particular text or word as for example "my name is Mahesh" means recognize a particular text. In language recognition, recognize a particular language as an example of English/Russian [5]. In the speaker recognition process, the identification of the speaker means that a particular sentence who is speaking. The detail recognition process is shown in Figure 2.

In Figure 2, this is shown the different steps of voice recognition. This paper is consisting of the speaker identification process that is marked in dotted lines that means a particular text/sentence deliver by a particular person [6]. In this research work, a normal voice (NV) is used for reference purpose and analysis of the voice tone of a speaker by different method lowered pitch (LP) and raised pitch(RP) [7].

Calculation of acoustic analysis of different speech signals In non-electronic disguised methods there are some changes in the frequency spectrum of speech signal MFCC, ΔMFCC, and ΔΔMFCC coefficients are used to specify the frequencies spectral property of speech signal [8]. Identification of speaker and feature extraction are calculated by the MFCC, ΔMFCC, ΔΔMFCC of all types of speech signals [9]. The acoustic feature and its statistical moments, correlation coefficient, mean and are calculated for normal voice (NV) for reference purpose as well as raised pitch and lower pitch voice signal by MFCC algorithm [10]. Using this approach the mean value and the correlation coefficients are essential for identification of voice signal. In this approach, the mean value and the correlation coefficient are essential for the identification of all types of voice signals. The speaker identification task is segmented into two stages: training stage and testing stage. In the testing and training stage, speakers enroll by providing voice samples to the system [11]. A speech model is formed with the extraction of speaker-specific details from these voice samples of the speakers. In the testing stage, the system compares the speaker's normal voice with the lowered and raised voice to make a decision. Speech samples are taken in the form of normal voice, lowered pitch and raised pitch [12]. In the feature extraction

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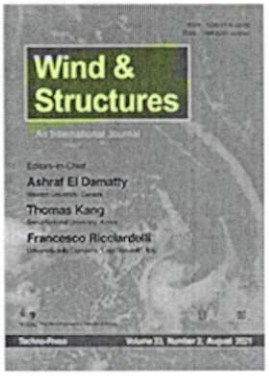

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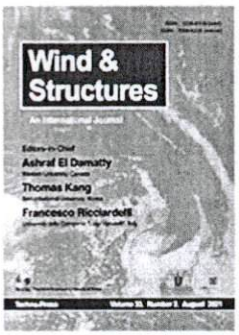

Theoretical and experimental modal responses of adhesive bonded T-joints

Mani Chandra Kunche, Pradeep K. Mishra, Hari Babu Nallala, Chetan K. Hirwani, Pankaj V. Katariya, Subhransu Panda and Subrata K. Panda

Abstract

The modal frequency responses of adhesive bonded T-joint structure have been analyzed numerically and verified with own experimental data. For this purpose, the damped free frequencies of the bonded joint have been computed using a three-dimensional finite element model via ANSYS parametric design language (APDL) code. The practical relevance of the joint structure analysis has been established by comparing the simulation data with the in-house experimental values. Additionally, the influences of various geometrical and material parameters on the damped free frequency responses of the joint structure have been investigated and final inferences discussed in details. It is observed that the natural frequency values increase for the higher aspect ratios of the joint structure. Also, the joint made up of Glass fiber/epoxy with quasi-isotropic fiber orientation indicates more resistance towards free vibration.

Key Words

ANSYS APDL; fiber orientation; free vibration; glass/epoxy composite; T-joint, FEM

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A Comparison of Fuzzy Game Matrix Solutions using Defuzzification Methods with a New Method

D.V.L.Prasanna, R.Subba Rao, A.V.S.N. Murthy, G.V.Ramana

Abstract: In our present research work, a fuzzy game matrix is solved using PM technique.The solutionof fuzzy game matrix using PM technique is compared with the solutions using first maximum, first minimum, centroid and centroid of centroid methods of defuzzification.

Index Terms: Saddle point,Principle of dominance, Arithmetic method, Method of Subgames, Fuzzy matrix game, Defuzzification, Centroid method,Centroid of centroid method.

I. INTRODUCTION

Game theory is "the study of mathematical models of conflict and cooperation between intelligent rational decision-makers." Game theory studies the general principles that explain how people and organizations act in strategic situations. It is an important tool used in economics, political science, and psychology, as well as logic, computer science, and biology [3,4]. Fuzzy logic is used to deal unclear situations. It is not connected with fixed or exact value but generally it deals with approximate or probabilistic value. In this, the situation lies possibly between 0 and 1 which is known as membership function. This came into existence by the extension of Boolean logic in which the situation is either true or false i.e., 1 and 0 respectively [5,7]. A fuzzy matrix is a matrix where elements of it lies in the closed interval [0,1]. The concept of a fuzzy matrix was introduced by Kim and Roush[1].In recent times Fuzzy matrices (FMs) remains as a broad subject in modeling, uncertain situations occurred in science, automata theory, logic of binary relations, medical diagnosis etc[2].The method of creating a crisp quantity fuzzy is called as Fuzzification. Defuzzification is the change of a fuzzy quantity to a specific quantity. R. Senthil kumara and D. Keerthana are discussed the solution of fuzzy game matrix using first maximum method of defuzzification in [7].L.N.PradeepkumarRallabandi et al studied the improved consistency ratio for pairwise comparison matrix in analytic hierarchy process(2016).

In this paper we presented the preliminary concepts/existing methods for defuzzification and the new approach established by the authors known as PM technique is given in section 2. Three examples are considered and the solutions are evaluated using all the methods mentioned in section 3.A table of comparison between all the methods given in section 4 with the suitable graphs.

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II. PRELIMINARIES AND PM TECHNIQUE

2.1 Definition: The saddle point of a payoff matrix is defined as the position of an element in the payoff matrix which is minimum in its row and maximum in its column and the value of the game is the gain at this point.

2.2 Definition: Principle of dominance is if one pure strategy of a player is better or superior than another.one (irrespective of the strategy employed by his opponent), then the inferior strategy may be simply ignored by assigning a zero probability while searching for optimal strategies.

2.3 Arithmetic method: It is a technique for obtaining optimal strategies for each player in 2×2 games without saddle point.

The steps involved in this method are 1. Find the difference of two numbers in column I and put it under the column II, neglecting the negative sign if occurs. 2. Observe the difference of two numbers in column II and put it under column I, neglecting the negative sign if occurs. 3. Similarly repeat the above two steps for rows also. The values that are obtained from the above steps are called oddments. These are the frequencies with which the players must use their courses of action intheir optimal strategies.

2.4 Method of sub games: This method is used for $2 \times norm \times 2$ games. This method subdivides the given $2 \times norm \times 2$ game into a number of 2×2 subgames, each of which is then solved and optimal strategies are determined. While solving subgames first check for saddle point. If saddle point exists that will be the value of the game. If saddle point doesn't exist, then solve the subgame by arithmetic or algebraic method.

2.5 Theorem[6]: For any 2×2 two- person zero –sum game without any saddle point, having payoff matrix for player A as

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An Efficient Method for Segmentation of Noisy and Non-circular Iris Images Using Optimal Multilevel Thresholding

Satish Rapaka[1], P. Rajesh Kumar[2], Rajasekhar. M[3], Y. B. N. V. Bhaskar[1]*

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Abstract - The richness and stability of the iris patterns make it a robust biometric attribute for recognition of individuals. Segmentation of the noisy and non-circular iris images is a challenging task now a day. In this paper, a new approach has been proposed to isolate iris from the unwanted portions of eye images. An evolutionary algorithm Improved Differential Search (IDS) based Otsu multilevel thresholding (OMT) has been introduced as a pre-segmentation process in the iris recognition framework. The resultant images are then segmented using Geodesic Active Contours (GAC) incorporated by a novel stopping function. The experimental results are validated by comparing the proposed method with the well existing methods. The proposed method has been tested on the databases that are available publicly such as CASIA v3 Interval, UBIRISv1, and MMU1.

Keywords: Integro-Differential Operator, Optimal multilevel thresholding, Differential search algorithm (DSA), iris segmentation, Circular Hough Transform.

1. Introduction

Segmentation is the crucial stage in any biometric authentication because the presence of noise such as specular reflections, occlusions of eyelid/eyelash, inhomogeneities in intensity levels and non-circular iris boundaries will affect the features of the iris patterns resulting in very poor segmentation accuracy. A significant number of authors have been proposed algorithms in the literature for segmentation of iris images captured under noisy environment[1]–[5]. Recently, the literature is focused on pre-segmentation of noisy iris images[6]–[12]

Authors in [3] proposed a robust and accurate pre-segmentation algorithm that combines hard clustering algorithm and an improved Hough transform for segmentation of very noisy images. A combination of integro-differential operator (IDO) and Random sample consensus (RANSAC) is then employed for detection of upper and lower eyelids. Authors in [2], proposed an algorithm for images captured under visible wavelength, which employs the K-means clustering algorithm as a pre-segmentation step, to estimate the iris boundaries circular Hough transform is then employed. Another method is due to Frucci et al.[10], which employ watershed transformation to partition grayscale images by employing region growing to a suitable set of seeds. The Taubin circle fitting algorithm is then applied on binarized watershed transform.

Multilevel thresholding of an image for segmentation process has recently emerged as a powerful tool. It is based on the fact that the objects in an image are expected to have a similar range of intensity values in the image histogram. One classification of thresholding techniques is bi-level (one threshold), in which image is segmented into two regions. In multilevel thresholding (more than one threshold) technique image is segmented into several distinct regions. Two popular histogram based thresholding methods are Otsu's and Kapur's methods[13]. In Otsu's method, thresholding of real images is chosen by maximizing the between-class separability. Whereas in Kapur's method, thresholding of real images is chosen by maximizing the entropy of the histogram.

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An Effective Software Effort Estimation based on Functional Points using Soft Computing Techniques

Rama Sree S, Ramesh S.N.S.V.S.C, Prasada Rao Ch

Abstract: Still in this 21st century, it is a great challenge for the Project Managers to make the software projects successful. The success of software projects relies on how accurately the estimates of effort, cost and duration can be made. Most of the standard surveys stated that only 30-40% of software projects are successful and the remaining are either challenged, cancelled or failed. One of the key reasons for failure of projects is inaccurate estimations. Effort Estimation should be carried out in the early stage of Software Development Life Cycle (SDLC) and it is an essential activity to establish scope & business case of software project management activities. Over estimation or under estimation leads to failure of the software projects. Many of the stakeholders are expecting the estimation of development effort in early stage for their better bidding. There are many methodologies like KLOC, Use Case Points (UCP), Class Points, Story Points, Test Case Points, Functional Points (FP), etc. to estimate effort in the software development. To estimate the effort in the early stage of software development, UCP, Story Points and FP are more preferable. The methods for estimation may be adopted based on the project complexity, functionality, approaches etc. In order to achieve an efficient and reliable effort estimate and thereby have a proper execution of software development plan, Soft Computing Techniques can be adopted in the various organizations and different research domains. In this paper, Functional Points have been selected for effort estimation and implemented using soft computing techniques like Neural Networks and Neuro Fuzzy techniques. After examination the results are evaluated using different error measures like VAF,MMRE,RAE, RRSE and PRED. Basing on results it is observed that the Neuro Fuzzy techniques provided better effort estimates

Keywords : SDLC, Soft Computing, KLOC, FP, Story Points, Neural Networks, Neuro-Fuzzy, PM..

I. INTRODUCTION

Now a days, the biggest challenge for the stakeholders who are involved in the development of software products is to provide the early and accurate effort estimations. Most of the projects fail due to inaccurate effort estimation. The Standish Group Report Chaos published in 2015 states that only 30% projects are delivered in time, 40% projects are more challenged and gets delayed and remaining 30% projects are cancelled after some amount of time. Either over estimations or under estimations leads to failure of the software projects [1]. The main reasons for inaccurate estimations in the software industry are unable to identify the functional requirements and non-functional requirements requested by the customer in the early stage of the SDLC. The capability of the Project Manager (PM) also influences the estimation of accurate and efficient software development effort as shown in Fig1. The PM is one who identifies the software development team's capability to deploy the requested software product within the schedule and budget[3]. Identifying the Risk factors in the early stage of the SDLC also can be a part of accurate software predictions.

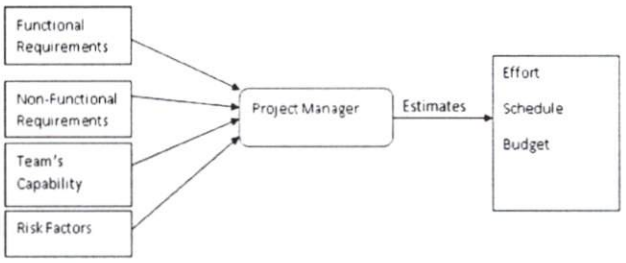

Fig 1: Project Managers Activity

Once these issues are resolved and known, the effort required to deploy the software product can be more accurately predicted. Functional Point Analysis (FPA) developed by IFPUG provides more precise measurements of software size and cost to develop quality software

A. *Functional Points*

Alan Albrecht while working for IBM, recognized the problem in measuring the size of the entire software product in the early stage of SDLC [2]. The basic idea of Albercht is that "the amount of services provided by system to the end user" can be evaluated by the data used by the product and transactions through which the services are delivered to the user [4]. In 1970, he developed a technique called Functional Point Analysis which appeared to be a solution to the size measurement problem. Function Point metrics are now widely used in determining the taxable value of software when industries are bought or sold. Function Points (FPs) measures the software product by quantifying the requested requirements of the user. Function Point Analysis (FPA) is a method of determining the size and complexity of the system in terms of the services provided

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Role of Heuristic Algorithms in Minimizing the Makespan of Fuzzy Flow shop Scheduling Problem

N.Selvamalar, V.Vinoba

Abstract : In this paper, the three fuzzy heuristics namely fuzzy Campbell-Dudek-Smith algorithm(FCDS), fuzzy Nawaz-Enscore-Ham(FNEH) algorithm and fuzzy Rapid Access(FRA) algorithm has been subjected to a comparative study to evaluate and assess the efficiency of the fuzzy models in various problems of random size.A sample data is chosen and 14 problems are generated with different job and machine size.The makespan is evaluated,compared and depicted using ORIGIN software.The worst case solution of every problem is compared with the heuristic schedule obtained in order to show the improvement in the solution when the above heuristics are applied.It is noticed that the FNEH algorithm stand tall above the remaining procedures adopted in this work except a few instances where the FRA procedure excels.

Keywords:Fuzzy flowshop,Octagonal fuzzy numbers,Fuzzy heuristic algorithms ,Comparison of makespan

I. INTRODUCTION

Flow shop scheduling has its own library of exact and heuristic methods namely Johnson algorithm[6],branch and bound method[5],Campbell-Dudek-Smith algorithm[1],Nawaz-Enscore-Ham algorithm[9], Rapid Access algorithm[2] etc., to solve the n-jobs m-machines problems.When fuzziness comes into picture ,the same methods are fuzzified by triangular,trapezoidal and octagonal fuzzy numbers to an extent[3,4,7,8,10,11,12].Since many heuristic procedures are available,it is advisable to have comparative study between the results obtained by these procedures for the future use. Section 2 deals with the comparison of the three heuristics fuzzy CDS,fuzzy NEH,fuzzy RA algorithms and their results from a sample data. Section 3 gives the conclusion.

II. COMPARATIVE STUDY

In this work, 14 different random fuzzy flow shop scheduling problems are considered. The processing times are octagonal fuzzy numbers. The various sizes of the problems are:

3 J 6 M	4 J 5 M	4 J 6 M	4 J 7 M	5 J 3 M	5 J 4 M	5 J 5 M
6 J 4 M	6J 5 M	7 J 3 M	8 J 3 M	6 J 4 M	4 J 4 M	6 J 3 M

The sample data is constructed in such a way that it includes the octagonal fuzzy numbers which are non-negative both symmetrical ,asymmetrical and their generalized mean values are ranging between 8 and 164.The problems are chosen randomly from the sample data given in the following table.The description of the algorithms which are found in Selvamalar et al.,[10,11,12] are applied to each and every problem one by one to get the optimum schedule.

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The makespan is evaluated in each case and is compared . In each case, all the three fuzzy heuristics are executed and the makespan is evaluated.The comparative study is done by increasing the machine size from 3 machines to 7 machines as well as the job size from 3 jobs to 8 jobs.The results obtained in the problems by applying the three fuzzy heuristics are tabulated based on their classification and the same has been depicted in bar charts.The difference between the solutions of the three methods is also studied.A comparison between the heuristic solutions and the worst case makespan is also done.

2.1.SampleData

The sample data consisting of the fuzzy execution times for jobs on each machine is tabulated in table 9. From the sample data , various size problems are identified and exposed to the three heuristics in the order FNEH,FCDS and FRA .

'*' in the tables represent the least makespan obtained by the respective method.As well once the heuristic schedule and the corresponding makespan is obtained , the generalized mean value of the makespan(GMV) is evaluated using the ranking of octagonal fuzzy numbers found in [10].Then the GMV's of the makespans due to three heuristics has been depicted into barcharts to clearly explain the outcome of these three methods.

2.2 Problems and their Solutions from three fuzzy heuristics

Table 1:**4-jobs problems**

	Heuristic	Makespan
4J 4M	2-1-3-4	(248,258,267,280,305,320,336,352)
	2-1-3-4	(248,258,267,280,305,320,336,352)
	2-1-3-4	(248,258,267,280,305,320,336,352)
4J 5M	1-4-2-3	(125,137,151,169,175,192,204,215)*
	1-4-2-3	(125,137,151,169,175,192,204,215)*
	1-4-3-2	(125,137,151,169,175,192,204,215)*
4J6 M	4-3-1-2	(159,168,178,193,206,216,227,237)*
	4-3-1-2	(159,168,178,193,206,216,227,237)
	3-4-1-2	(172,181,193,208,221,231,241,253)
4J 7M	3-1-4-2	(165,176,189,205,218,229,241,253)
	3-1-4-2	(165,176,189,205,218,229,241,253)
	1-3-4-2	(167,178,196,212,224,234,245,257)

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An Intelligent IOT Mechanism for Collision Detection and Prevention at Railway Level Crossing

Raja Sekhar Kummari, Phani Sridhar Addepalli, Krishna Mohana Tenneti

Abstract: With the rapid growth of things connected to Internet leading to the massive scale on increase of devices for automation and control. An explosive demand adds the strength to ubiquitous computation and the device interaction over cyber physical systems. This commendable support is taken in to practice for giving an automated IOT solution for the railway level crossing problems faced across the countries. Especially in populated countries like India the size of traffic on roads and railways is happening in a short time at a great rate. The situation is always alarming at the exchange of transport between these mechanisms at a common point called railway level crossing. In this paper we are providing a novel, cost effective and intelligent IOT solution using Raspberry Pi outfitted with sensors, RFID tags and load cell to predict the arrival or crossing of trains, also controlling the gates to get rid the problems arising manually by restricting the vehicles not to face the disasters. It enhance the effectiveness, trustworthy of the railways in the community of passengers.

Index Terms: CPS, Load Cell, MQTT, RFID, Sensors, Ubiquitous Computing, Raspberry Pi.

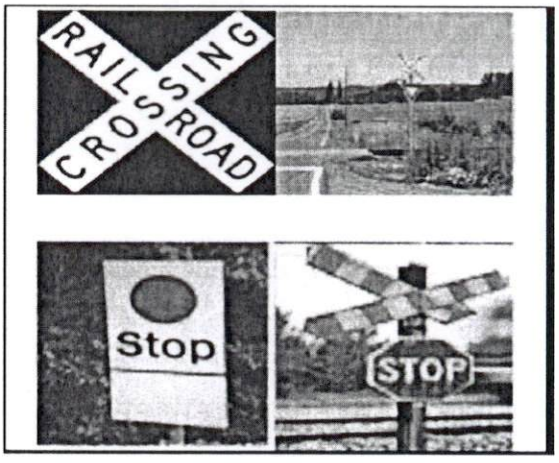
I. INTRODUCTION

Railway is considered as one of the cheapest and safest mode of transport worldwide. Therefore, safety is the crucial aspect in railway operation everywhere. With the ever increasing population, the railway industry always encounters separate problems due to technical and human errors, especially at level crossings. The Level crossing is a cross-sectional area where rail track and roadway intersect each other. In most cases, level crossing remains unattended mostly in rural and remote areas. Hence, such intersection requires constant human coordination and monitoring on regular basis. The level crossing is divided into two types namely manned and unmanned. Almost every year there are accidents/collisions reported at level crossing. Nearly 5,800 unmanned railway crossings are a key cause of rail accidents in India. As per a report 109 rail accidents have occurred at unmanned crossings during the past years. As per the report from Times of India 66% of accident fatalities occur at level crossings due to carelessness of road users and the gatekeepers. Of all the road infrastructures, level crossing is considered as one of the most dangerous spot. Actually, 29% of mishap happens in railroad framework occur at level

intersection. Much of the time, mishaps occurred because of lack of regard of street clients and vehicle administrators towards detached street signs or presumably due to awful climate conditions. From the investigation of the reason for the mishap Indian Railways found was that of the considerable number of mishaps 87.78% were because of the human disappointment. Subsequently, there is a critical need to dispense with these components. To wipe out these variables we have to cause things to speak with one another and consequently the M2M innovation goes to the image [1].

Indian Railways was formulated for a period of ten years (2003-2013) entailing multi-pronged strategy, laying emphasis on prevention by reducing human dependence and mitigation of consequential effect in case of an accident. The Corporate Safety Plan envisages reduction of accidents on IR by the year 2012-13, substantially by bringing down the accident rate and is better than many of the advance Railways of the world.

The Road Traffic crosses the Railway Track either on "Grade Separated Crossing" (different Levels of rail and road) or at "Level



Crossing" (Road and rail are at same levels). The level crossings are made to facilitate the smooth running of traffic in a regulated manner governed by specific rules and conditions.

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Stationary Wavelet Transform based Image Fusion using fusion rules

Nainavarapu Radha, Tummala Ranga Babu

Abstract: Multifocus image fusion is a current research topic in the area of image processing for visual sensor networks. Discrete wavelet transform based fusion algorithms suffer from unintended effects like smoothing of edges, loss of contrast and artifacts. To overcome these problems, Stationary Wavelet Transform based algorithm using fusion-rules is proposed and applied to multifocus images. Stationary Wavelet Transform well preserves the edges and avoid artifacts with its shift-invariance property. Entropy and spatial frequency based fusion rules in this work can effectively characterize the intensity variations in an image there by loss of contrast is minimized. Simulation results show that the proposed method can amply preserve the edges and also avoid artifacts with no loss of contrast.

Keywords: Stationary Wavelet Transform, Entropy, Image Fusion, Spatial Frequency, Fusion rules.

I. INTRODUCTION

In visual sensor networks (VSN), the sensors are cameras which can capture, process and transmit a large number of images in surveillance, traffic and industrial applications [1]. However, an entire focused image is not captured by the cameras in visual sensor networks (VSN). This makes it difficult for VSN to analyze and understand the images. To address these issues, fusion techniques are desirable for fusing two or more images with divergent focus levels into a focused fused image.

II. LITERATURE REVIEW

The fusion techniques using Laplacian pyramids [2], Discrete Wavelet Transform (DWT) [3], discrete cosine transform [4], Walsh Hadamard Transform [5], multiresolution singular value decomposition (MSVD) [6], Wavelet based methods [7-12] are existing in the literature. The discrete wavelet transform (DWT) based method had been verified to be an effective image fusion technique. However, shift-variance property of DWT introduces unintended effects. The shift-invariant stationary wavelet transform (SWT) eliminates the unintended effects of DWT. Fusion rules are also essential to get a sharper fused image from source images considered for fusion. Hence, in this paper stationary wavelet transform and fusion rules based algorithm proposed for fusion.

III. PROPOSED METHODOLOGY

(a) Multi-focused source images are considered for fusion.

(b) Perform RGB to YCbCr color Transform on source images.

(c) Apply 1-level SWT on source images to get low and high-frequency sub- bands using Eq. (1).

$$cA_{j+1,k_1,k_2} = \sum_{n1}\sum_{n2} F_0^{\uparrow 2^j}(n_1-2k_1)F_0^{\uparrow 2^j}(n_2-2k_2)cA_{j,n_1,n_2}$$

$$cD^h_{j+1,k_1,k_2} = \sum_{n1}\sum_{n2} F_0^{\uparrow 2^j}(n_1-2k_1)G_0^{\uparrow 2^j}(n_2-2k_2)cA_{j,n_1,n_2}$$

$$cD^v_{j+1,k_1,k_2} = \sum_{n1}\sum_{n2} G_0^{\uparrow 2^j}(n_1-2k_1)F_0^{\uparrow 2^j}(n_2-2k_2)cA_{j,n_1,n_2}$$

$$cD^d_{j+1,k_1,k_2} = \sum_{n1}\sum_{n2} G_0^{\uparrow 2^j}(n_1-2k_1)G_0^{\uparrow 2^j}(n_2-2k_2)cA_{j,n_1,n_2} \quad (1)$$

(d) Spatial frequency based fusion rule is used to fuse low frequency coefficients in low- frequency sub- bands using Eqs. (2)-(4).

$$RF = \sqrt{\frac{1}{N\times N}\sum_{i=1}^{N}\sum_{j=2}^{N}\left[I(i,j)-I(i,j-1)\right]^2} \quad (2)$$

$$CF = \sqrt{\frac{1}{N\times N}\sum_{j=1}^{N}\sum_{i=2}^{N}\left[I(i,j)-I(i-1,j)\right]^2} \quad (3)$$

$$SF = \sqrt{(RF)^2+(CF)^2} \quad (4)$$

(e) Entropy based fusion rule is used to fuse high frequency coefficients in high - frequency sub- bands using Eq. (5).

$$E = \sum_{j=0}^{G} p(i)\log_2 p(i) \quad (5)$$

(f) Get composite fused image by applying 1-level inverse SWT on low- and high-frequency sub-bands using Eq. (6).

$$cA_{j,n_1,n_2} = \frac{1}{4}\sum_{i=0}^{3}\Bigg\{\sum_{k_1}\sum_{k_2} F_1(n_1-2k_1-i)F_1(n_2-2k_2-i)cA_{j+1,k_1,k_2} + \sum_{k_1}\sum_{k_2} F_1(n_1-2k_1-i)G_1(n_2-2k_2-i)cD^h_{j+1,k_1,k_2} + \sum_{k_1}\sum_{k_2} G_1(n_1-2k_1-i)F_1(n_2-2k_2-i)cD^v_{j+1,k_1,k_2} + \sum_{k_1}\sum_{k_2} G_1(n_1-2k_1-i)G_1(n_2-2k_2-i)cD^d_{j+1,k_1,k_2} \quad (6)$$

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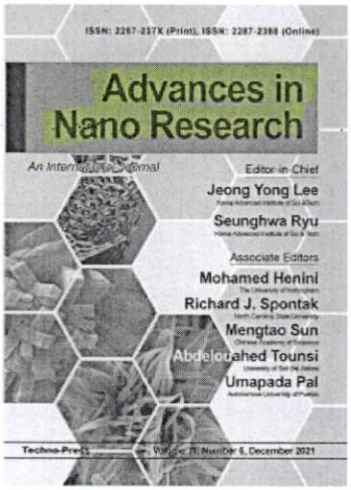

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Full Text PDF

Effect of nano glass cenosphere filler on hybrid composite eigenfrequency responses - An FEM approach and experimental verification

Harsh Kumar Pandey, Chetan Kumar Hirwani, Nitin Sharma, Pankaj V. Katariya and Subrata Kumar Panda

Abstract

The effect of an increasing percentage of nanofiller (glass cenosphere) with Glass/Epoxy hybrid composite curved panels modeled mathematically using the multiscale concept and subsequent numerical eigenvalues of different geometrical configurations (cylindrical, spherical, elliptical, hyperboloid and flat) predicted in this research article. The numerical model of Glass/Epoxy/Cenosphere is derived using the higher-order polynomial type of kinematic theory in association with isoparametric finite element technique. The multiscale mathematical model utilized for the customized computer code for the evaluation of the frequency data. The numerical model validation and consistency verified with experimental frequency data and convergence test including the experimental elastic properties. The experimental frequencies of the multiscale nano filler-reinforced composite are recorded through the impact hammer frequency test rig including CDAQ-9178 (National Instruments) and LABVIEW virtual programming. Finally, the nano cenosphere filler percentage and different design associated geometrical parameters on the natural frequency data of hybrid composite structural configurations are illustrated through a series of numerical examples.

Key Words

modal responses; nano glass cenosphere; hybrid composite; FEM; experimental analysis

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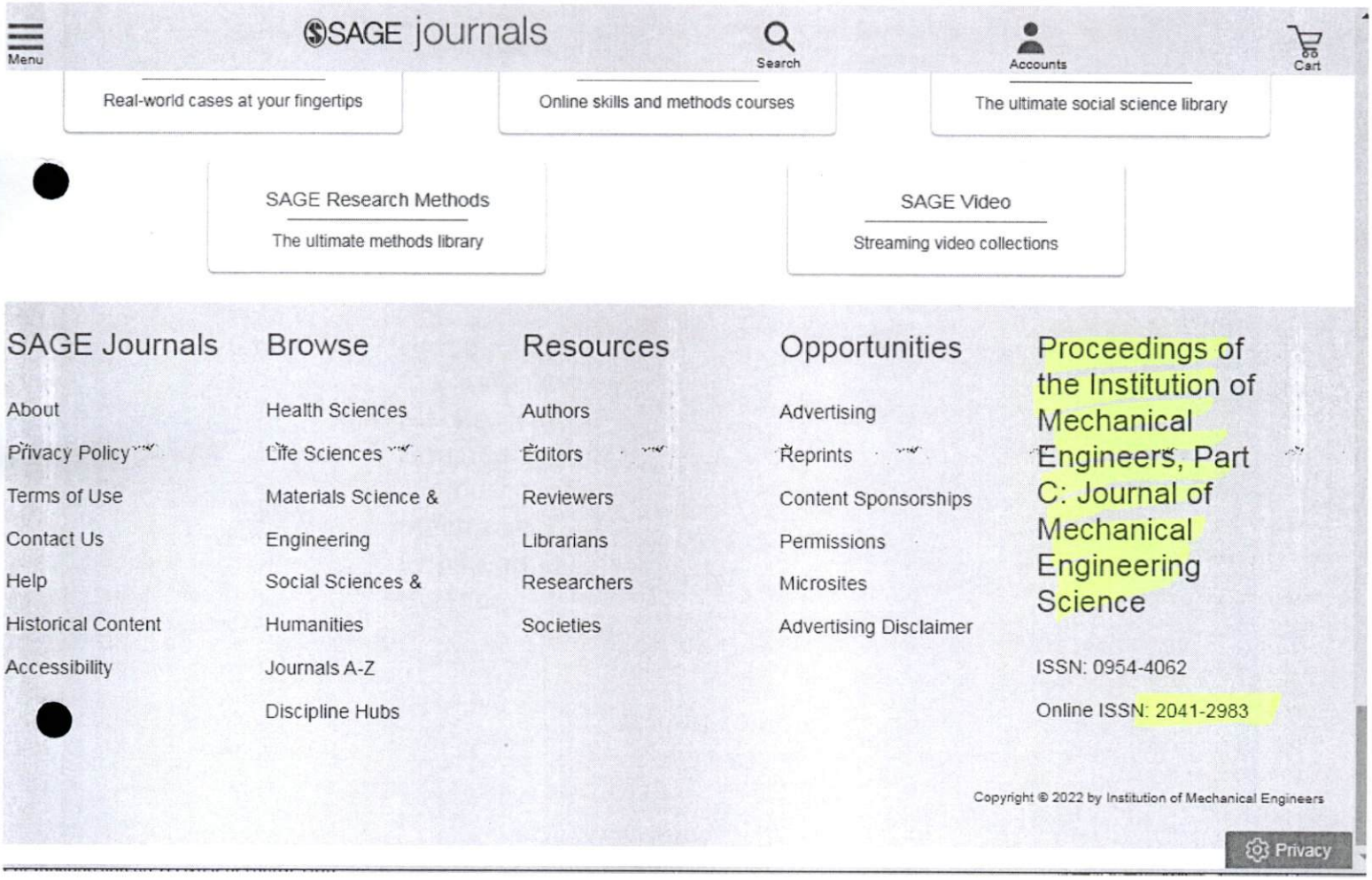

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Proceedings of the Institution of Mechanical Engineers, Part C: Journal of Mechanical Engineering Science

Investigation of optimal process parameters for laser cutting of Inconel-718 sheet

Prashant Kumar Shrivastava, Bhagat Singh, Yogesh Shrivastava, Arun Kumar Pandey, Durgesh Nandan

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Abstract

Precise machining of advance material like Inconel-718 is an emerging need. Selection of an appropriate optimal range of cutting parameters is quite essential to achieve the high-quality cut and is a challenging task within this domain of study. The aim of this research is to develop a robust prediction model, which can suggest the desired range of cutting parameters for accomplishing better cutting quality, precision, and geometrical accuracy. Experiments have been performed on a 300 W (CNC-PCT 300) pulsed Nd: YAG laser cutting system at various levels of input cutting parameters, namely gas pressure, standoff distance, cutting speed, and laser power. Thereafter, response surface methodology has been adopted to develop mathematical models in terms of aforementioned input cutting parameters for geometrical quality characteristics: top kerf width and bottom kerf width. These developed models have been validated by comparing the predicted values wi

Journal of Heat Transfer

About the Journal

Purpose

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In this present work, the influence of corrugated booster reflectors (CBR) in a centrally finned twist (CFT) inserted solar thermal collector (SC) on heat transfer and thermal performance characteristics has been approached experimentally. The experimental trials have been made with two different twist ratios (Y = 3 and 6) for typical twist (TT) and CFT under same working conditions. The results were compared with the plain tube SC with CBR plain and also with the plain tube SC with flat booster reflectors (FBR plain). The experimental result of the CBR plain has been verified with the standard equations and found the deviations within ±10.05% for Nusselt number and ±9.42% for friction factor. The CBR has 1.6% higher effective reflection area than the FBR. Hence, the CBR augmented the Nusselt number around 8.25% over the FBR. When compared to the CBR plain, the CFT of minimum twist ratio (Y = 3) offered 10.09% higher thermal efficiency. In addition, empirical correlations have been derived for predicting the Nusselt number and friction factor. The deviations of the predicted value from the experiment value fall within ±10.62% for Nusselt number and ±11.28% for friction factor.

Issue Section: Heat and Mass Transfer
Topics: Friction, Heat transfer, Optical mirrors, Solar collectors

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Journal of Heat Transfer

RESEARCH-ARTICLE

Influence of Corrugated Booster Reflectors in a Centrally Finned Twist Inserted Solar Thermal Collector on Heat Transfer and Thermal Performance Characteristics

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Circuits, Systems, and Signal Processing

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Rapid developments in the analog and digital processing of signals for communication, control, and computer systems have made the theory of electrical circuits and signal processing a burgeoning area of research and design. The aim of *Circuits, Systems, and Signal Processing* (CSSP) is to help meet the needs of outlets for significant research papers and state-of-the-art review articles in the area.

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The Editorial Board is international, and papers are welcome from throughout the world. The journal is devoted primarily to research papers, but survey, expository, and tutorial papers are also published.

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Image Inpainting Based on Fractional-Order Nonlinear Diffusion for Image Reconstruction

G. Sridevi & S. Srinivas Kumar

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Abstract

Image inpainting, image deblurring, and noise removal are influential concepts in the field of digital image processing. Second-order diffusion-based image restoration models suffer from staircase effects and connectivity principle, while fourth-order models suffer from speckle artifacts. In this article, a robust image inpainting model using fractional-order nonlinear diffusion driven by difference curvature is proposed and fractional-order variational model is utilized to remove the noise and blur. Fractional-order derivatives can deal well with edges and attain good trade-off between edges preservation and elimination of staircase and speckle artifacts of an image. Difference curvature is a feature descriptor which can effectively characterize the intensity variations in the image. In this work, difference

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Image Fusion using Eigen Features and Stationary Wavelet Transform

S.B.G.Tilak Babu, K.H.K.Prasad, Jyothirmai Gandeti, Devi Bhavani Kadali, V.Satyanarayana, K.Pavani

Abstract: *Image fusion is a technique of fusing multiple images for better information and more accurate image compared source images. The applications of image fusion in modern military, multi-focus image integration, pattern recognition, remote sensing, biomedical imaging etc.In this paper discussed, pros and cons of various newly arrived existing techniques in spatial and transform domain image fusion techniques. The individual advantages of Stationary Wavelet Transform (SWT) and Principal Component Analysis (PCA) is become great advantage to the proposed method.Standard dataset is used to evaluate the performance of proposed method, the obtained results are compared with exiting methodologies and shows robustness in terms of entropy, standard deviation and Peak Signal to Noise Ratio (PSNR).*

Key Words: *Fusion, multi-focus image integration, SWT, PCA, PSNR, standard deviation.*

1. INTRODUCTION

Image fusion helps to extract more information from a single composite image over two separate images. The image fusion method having many applications likemulti-modality (e.g., visible and infrared) image fusion, multi-focus image integration, multi exposure image fusion, remote sensing, biomedical imaging etc.Proper design of fusion rule for specific application like multi-modality is very important task in research. Very few articles are identified in literature on a fusion rule applied on multiple image fusion applications[1], more over efficient design of a fusion rule that is applicable to multiple fusion applications is much needed to present industries.

The image fusion can be achieved in spatial domain or frequency domain. Jiayi Ma et al., proposed a technique of fusing infrared image and visible image [15]. The fusion of two images is depended on Gradient Transfer Fusion (GTF), GTF is a combination of gradient transfer with minimization of total variation. Jiayi Ma et al., are succeeded image fusion without any registration of source images [5]. Yanfei and Nong [6] proposed a multi sensor image fusion technique based on hierarchical multi resolution along with attention. Important areas are identified by using visual attention model and maximum entropy. Based on adoptive weighing rules, first level of fused image is obtained from visible image and infrared image. Finally,Non-Subsampled Counterlet Transform (NSCT) is used to obtain final fused image. Huafeng Li [7] also proposed for the fusion of multi sensor image combination based on NSCT. Jun Lang and Zhengchao image fusion technique [8] provides less spectral distortion and good spatial resolution based onadaptive pulse coupled neural network (PCNN) anddiscrete fractional random transform.Various datasets are available to test fusion algorithm thoroughly, example source images are shown in table1. Usually, infrared and visible images are fused to extract more information from images.

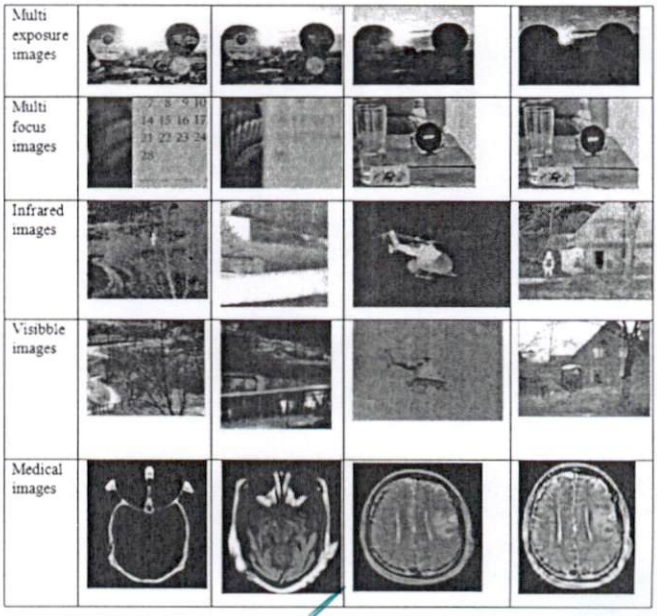

Table1. Various source images for fusion

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Effect of Penetration of Solar DGs on Transient Stability of Captive Power Generation Units

Ramachandra Murthy K. V. S. , Bhimaraju P. S. D. , Ravindra K

Abstract : In this work, transient stability analysis of industrial generator units is carried out using rigorous simulation study. The effect of Solar Distributed Generator Units on transient stability of captive power units is studied in this work. Industrial system with 39 Buses is considered with one utility bus, and nine captive generation units. The total active power load of the system is 121.57 MW and reactive power demand is 56.6 MVAr. The work is carried out in two stages. In the first stage, Critical Clearing Times (CCTs) are obtained without introducing any DG. In the second stage, CCTs are obtained with four Solar Power DGs at four different load buses. Triple line to ground faults at 9 Generator buses and 7 load buses are considered for obtaining Critical Clearing Times (CCT). It is observed that transient stability of system is improved by placing DGs. For the faults on Generator buses, CCTs are improved by 14.6% with DGs on average. For the faults on load buses, CCTs are improved by 27% with DGs on average. The detailed results are tabulated in this paper.

Keywords : Critical Clearing Time, Transient Stability, Distributed Generators.

I. INTRODUCTION

The transient stability analysis is an important area of research in power system assessment and deals with electro-mechanical oscillation of generators when they are subjected to perturbations. The variation of the rotor angle with respect to time is studied to verify and assess the stability. For any given perturbation, if the swinging of the rotor is gradually damped and rotor angles settle within the safe operating zone of the system, the power system is said to be transiently stable. Fault is simulated at a particular bus or on a line and Critical Clearing time (CCT) is evaluated for making the transient stability analysis of power system. CCT is the maximum allowable time for clearing the fault, for which the system remains stable.

In the case of a faults occurring on transmission line, faulted line is separated from the healthy part of the system and then reclosed. If the time taken for separation and reclosing power system is below a threshold value, the power system remains stable. If the time taken for separation and reclosing is greater than the threshold time, the power system becomes unstable. Thus, the determination of CCT is an important task in the transient stability assessment for a given fault condition.

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Distributed generation is relatively smaller power generation units of Solar, Wind and Mini Hydro. Olulope et al worked on how hybrid DGs effect transient stability of power system [1]. All the countries in the world are now going for DGs because of various benefits [2]. Tiam et al studied the result of installation of large scale Solar PV on the transient stability [3]. Azmy studied the outcome of installing fuel cell on transient stability of power system [4]. Reza analyzed the effect of installation of huge number and capacity of DGs on transient stability [5]. It is found that penetration level of DGs is an important parameter in studying the effect on system stability. Systems with more number of sources can provide more reliability and better quality power [6]. Several researchers worked with single DG source [7-10]. The system inertia for solar PV or fuel cell is very low [11]. DGs output depends on weather conditions.

Arutchelvi and Joanne worked on power supplied to residential load from the hybrid system consisting of PV and wind system connected to power grid [12, 13]. Dali studied an isolated system which works at low voltage with energy storage facility, PV and wind for better energy management [14].

Within an year, the percentage of penetration of DGs in USA may increase by 25% than that of 2012 [15]. The relays and Circuit Breakers might not be able to operate in bi-directional power flow which would be the result of DG connection in radial networks. The controllers need to be redesigned in the present scenario to offer reliable services to remote villages. Price of electricity depends on the demand at that time of the day in countries like US. DGs can be used at peak hours. [16].

In this work, without DGs, CCTs were obtained considering faults at 17 locations. Keeping the load constant, 4 Solar DGs were introduced by reducing the active power generation on industrial generator units and grid. Again CCTs were obtained for the same number of faults and same locations. Results were compared for the two cases. Section 2 presents system modelling, Section 3 and 4 present results and conclusions respectively.

II. SYSTEM MODELLING

In this section, General Structure of the Power System, Generator Modeling and Load modeling are presented. The power system consists of transmission network and various motors and generators of wide ranges connected to it. Transmission network which is static contains, transmission lines, shunt/series fixed reactance and transformers. The dynamics associated with these components are relatively fast and therefore

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Retrofitting Measures of Guntupalli Caves, West Godavari District, Andhra Pradesh, India, using Reinforced Rock Technique

S.R.K.Reddy, A.Satish Kumar, P.Urmila

Abstract— India is known for its rich, diversified and cultural properties. Assessment, evaluation and maintenance of ancient and historical monuments is a major concern today. Most of the historical structures which were built in earlier 1950s are now found unsafe if cheeked by present codes. Disintegration / deterioration due to continuous weathering processes and bitter failure examples from recent natural hazards reveal the importance of restoration / retrofitting measures.

In this paper, a case study on Guntupalli Caves, one of the finest testimonials of Buddhist Heritage, located in eastern ghat region of A.P. state, India, is taken up. The important monuments located in the study area are rock cut temples, monasteries and ruined Mandapa. Rock samples of different monuments are collected and tested in the laboratory and from test results, it is observed that the compressive and bending stress values are low and found vulnerable against any further loading. A new retrofit concept "Reinforced Rock" technique is adopted by introducing steel flats / bars in tension zone of rock samples. Test results have shown that compression and bending stress values are increased by two to four times compared with the results of those obtained in rock samples without reinforcement.

Index Terms— Rock cut monument, retrofit technique, Reinforced rock, bending stress.

I. INTRODUCTION

India is possessed with one of the oldest civilizations in the world and its past heritage and cultural wealth have been the subject of interest of the entire humanity. The spirit of Antiquarianism in India was best represented by the Asiatic Society of Bengal, founded in 1784 by William Jones. In 1861, the Archaeological Survey of India (ASI) was established and started as a mission and functioning towards the cause of protection, preservation and conservation of built heritage and antiquarian remains of India. India is an active member on world heritage from 1977 and has been working in close co-operation with various international agencies from different parts of the world.

Besides ASI, State Governments, Universities, Research Organizations and District local administrations are also working in these conservative programs.

Cave monuments claim their due share in the heritage properties as they were in the form of shelters/dwellings for human beings right from stone-age to hermitage. Throughout the history, primitive people have made use of caves for shelter, burials such as rock – cut – tombs or as religious sites.

Cave heritage can be broadly categorized into natural caves, temples/ monuments built in natural caves and rock-cut built caves / monuments along low level hill slopes. The present study of Guntupalli Caves [1] falls under the category of rock – cut caves.

Rock – Cut caves are built only by generations of religious nature and mostly confined to East and Southeast Asian countries.

The heritage properties are exposed to natural weathering actions and man- made disasters which threaten their integrity and values. Since these are on the verge of extinction due to hostile conditions of weather, encroachments in the name of development works, it is now the sacred duty of anybody to safe guard them from all odds.

The real challenge is to identify the protective measures and conservation of such historical monuments [2]-[4] with a view to assure the survival of these cultural heritage for centuries to come, with a little change as possible, but without altering the authenticity of their original appearance and character.

Project Outline

Guntupalli Caves are widely acclaimed as one of the finest and beautiful sites in the Eastern ghat region. The archaeological site under study is located about 45Km north of Eluru, West Godavari District, Andhra Pradesh, India. The location map of the study area is presented in Fig.1

The beautiful conglomeration of these monuments is constructed with great reverence by Buddhist community in the oldest centuries. The epigraphical records mention that these caves dates back to the ancient periods of 3^{rd} – 2^{nd} century to $5^{th}$to 6^{th} century A.D. The main significance of these sites is that the age of some of the monuments pre-dates even world heritage sites of Ajanta and Ellora caves of Maharashtra. The display of superb craftsmanship of these antiquities is also termed as "Ajanta of Andhra Pradesh". These caves were excavated along the slopes of the fragile sand stone hills of upper Gondwana formations.

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Influence of Sisal Fibers on the Properties of Rammed Earth

M Eswar Kumar Yadav, P R Kishore, A S Kumar, A S Swetha Sri

Abstract— The use of rammed earth has been increasing widely during recent years in many countries as an alternative material for building houses due to its valuable characteristics such as affordability, environment friendly, comfort, strength and durability. This thesis presents the result of an experimental study to evaluate the compressive strength and bond strength properties of untreated, treated bamboo splints and steel reinforced cement stabilized rammed earth blocks. To overcome the deficiencies of blocks, sisal fibers are added to improve the performance of CSRE blocks. Fibers are secondary reinforced materials and acts as crack arresters which improves the strength of cement stabilized rammed earth blocks.

In this experimental study, red soil is mixed by adding four different percentages (5%, 10%, 15%, and 20%) of OPC and sisal fiber with 0.2%, 0.4%, 0.6%, 0.8%, and 1.0% by weight of soil respectively. The bamboo splints were treated by soaking them in chemical solution of boric acid, Copper -Sulphate and Potassium Di-chromate (1.5:3:4).The resin-based adhesive with coarse sand will be applied to the top of bamboo splints. After 28days of curing period the cubes were tested for compressive strength, pull-out test is done for a series of CSRE blocks in which Bamboo splints and steel bars are embedded to find out its bond strength.

KEYWORDS:— Rammed Earth, Cement Stabilised Rammed Earth (CSRE), Sisal Fiber, Compressive Strength, Bond Strength.

1. INTRODUCTION

a) Rammed Earth: As demand for housing construction increases with affordable materials, it is best for us to choose the rammed earth, and the earth is an ancient form of monolithic earth wall construction. The use of mudguards for the application of load bearing and no-load bearing can be seen all over the world. The properties of the rammed earth can be enhanced by physical, chemical and mechanical stabilization. Physical stabilization is achieved by the proper mix ratio material of gravel, sand and clay. Mechanical stabilization is achieved by dynamic compression using a manual hammer (or) pneumatic hammer. Chemical stabilization can be achieved by mixing chemicals such as cement and lime to improve soil properties.

Rammed district construction can be classified into two groups: stabilized rammed earth and unstable rammed earth. In an unstable buried land, the soil consists of a mixture of sand, gravel, silt and clay. On the other hand, stabilized soil can be obtained by adding cement, lime, etc. to the soil. The mixture is wetted with the optimum moisture content before sanding between the molding operations. China's Great Wall of China, built about 3000 years ago, has a wide area based on Japanese Horyuji temples and rammed earth, just like the wall of the earth built about a year ago.

b) Sisal Fiber: Sisal fiber is one of the most widely used natural fibers and grows very easily. This plant starts with teeth and gradually grows, making roses with sword-shaped leaves. Each leaf contains several long, straight fibers. While peeling, the leaves are suitable to leave behind rough fibers and to remove pulp and plant material. The fibers can be spun for the production of yarns and fabrics or can be pulped to make paper products. The sisal fiber is completely biodegradable and the green complex is made of soy protein resin modified with gelatin. Commercial use of sisal in composites has increased due to strength, low density and environmental friendliness and cost effectiveness.

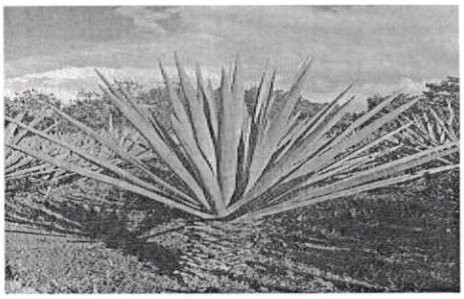

Fig 1. Sisal Plant.

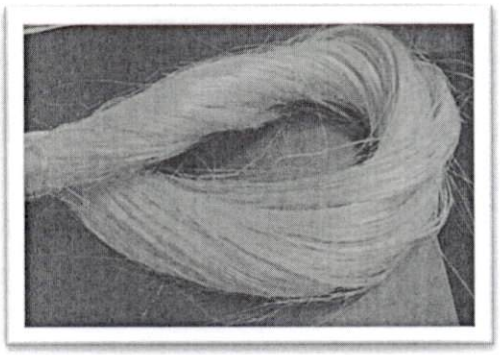

Fig.2 Sisal Fiber.

2. OBJECTIVE

- To identify various materials that can be used in construction as a replacement of concrete materials.
- To make the construction works eco-friendly.
- To enhance the strength of CSRE blocks by adding the Sisal fiber.

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Evaluation of Drainage and Surface Water Resources of Brahmayyalingam Lake in Agiripalli Mandal, Krishna District, A.P., India Using Geo-Spatial Technologies

G.T.N.Veerendra, A.V. Phani Manoj, Adari Satish Kumar, Pallepamula Urmila

ABSTRACT--- The water assets preservation and management assumes an essential part in the financial advancement of a country. In view of water need and the idea of improvement of water assets on watershed evidence has picked up significantly over the most recent two decades. The expanding request set on them has empowered examinations, situated towards the assessment of the assets, which is the reason for the detailing of plans for its investigation, administration, and preservation. The protection, improvement, and administration of surface water assets raise the generation level and maintain the same, it is conceivable through watershed-based projects. The Brahmayyalingam Lake is the geohydrological framework is a vital piece of Budameeru waterway of Kolleru basin. It is exceptionally impossible to miss to take note of that this geohydrological structure is subjecting to visit flooding amid rainstorm and intense water shortage issues amid whatever remains of the year. The principal target of the present paper is to create spatial data on water and surface water assets in Brahmayyalingam lake watershed. Geospatial advancements that incorporate Remote sensing and GIS will be utilized for creating data base on water and surface water bodies, the required information consolidates satellite pictures and other subordinate information as Survey of India (SOI) toposheets, reports, small scale maps, ground truth/field information and so forth.

Index Terms—
GIS - Geographical Information Systems, SOI- Survey of India, SRTM - Shuttle Radar Terrain Mapper

I. INTRODUCTION

According to recent studies it was identified that, globally, natural resources are going under severe threaten the present circumstances [Bronmark.C et.al, 2002]. The increasing anthropogenic activities pose severe pressure on various natural resources, together with forest and water resources [Bonell.M et.al, 2004]. The running down of these resources have an impact on micro climate state of region transforming the existing natural landscapes into undesirable land structures unsuitable for use [Hofer.T et.al,1993].The fall and loss of water storage potentialities like tanks, canals etc., are at the same rate at which forests are dishonored since water is noted as the crucial & critical constituent necessary for individual utilization also with agricultural usage, safety, management and protection of these assets are decisive for the sustainability of habitants .[Johnson et.al,2001].

1.1 Remote Sensing:

Remote sensing is the acquiring of information about an surface object without having physical contact with the object and thus in difference to on site study.

PROCESS OF RS

Remote sensing is another category of geography. In present technology usage, the term generally refers to the use of above ground sensor technologies to spot and categorize objects on Earth by means of disseminated signals (e.g. EMR). It may be split into active remote or passive (e.g. sunlight) when information is purely witnessed.

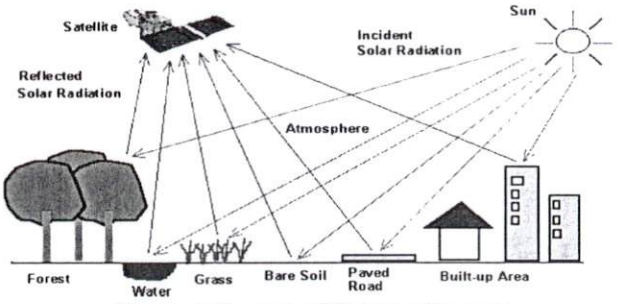

Figure 1 Process of Remote Sensors

Passive sensors assemble radiation that is emitted or reflected by the entity or neighbouring vicinity's. Reflected sunlight is the most familiar resource of radiation measured by the sensors, examples consist of infrared and radiometers.

1.2 Geographic Information System:

A GIS is an automated based tool for mapping and evaluating features on earth. GIS innovation amalgamates across the board database methods, for example, enquiry and factual examination, with maps. GIS oversees area based data and gives instruments to show and examination of different measurements, including populace qualities, monetary advancement openings, and vegetation composes. GIS enables you to connect databases and maps to make dynamic showcases. Additionally, it provides tools to visualize, certainty, and overlay of those databases in certain ways that are not possible with conventional spreadsheets. These abilities differentiate GIS from other information systems, and make it valuable to an extensive choice of

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Regenerative Engineering and Translational Medicine

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A Review on Surface Modifications and Coatings on Implants to Prevent Biofilm

P. S. V. V. S. Narayana & P. S. V. V. Srihari

Regenerative Engineering and Translational Medicine
6, 330–346 (2020)

Abstract

Bacterial infections associated with biomaterials are currently regarded as the most severe and devastating complications for their use as implants and medical devices. Biofilm is the major cause of bacterial infections associated with biomaterials. This review presents the biofilm formation, associated infections, and their current prevention strategies. The loss of efficacy of conventional antibiotic therapies leads to the development of antibacterial surfaces and coatings. Multifunctional surfaces and coatings can prevent biofilm formation and can become a novel strategy to fight biofilm. In this review, attention is focused on different surface modification techniques, surface coatings, and their current manufacturing methods to produce antibacterial biomaterials using surface engineering and nanobiotechnology.

Lay Summary

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The authors declare that they have no conflict of interest.

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Full Length Article

Performance and emission characteristics of variable compression ratio CI engine fueled with dual biodiesel blends of Rapeseed and Mahua

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Highlights

- Dual biodiesel was prepared by mixing Rapeseed and Mahua biodiesel by equal volume.
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Development of Therapeutic Food for Adolescent Girls

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Abstract:

Adolescents constitute over 21.4 % of the population in India. This age group needs special attention as is a period of rapid transition from childhood to adulthood that normally is characterized by important psychological and social changes in the age group of 10 -19 years. The adolescents number is expected to reach 1.13 billion by the year 2025. It is during the period of adolescence that nutrient needs are the greatest. Hence, the specific objectives of our study are to identify the key nutritional problems that affect adolescents and to develop a therapeutic food fulfilling their requirements. The present study was undertaken for the preparation and evaluation of a therapeutic food for Adolescent girls formulated with Bengal gram, Soya bean, Barley, Green gram, wheat and Ragi. Experiments were carried out in the Quality control lab, Andhra Pradesh Foods Pvt. Ltd. to study their chemical composition and overall acceptability. All the formulations were prepared according to the RDA requirements for adolescent girls. The therapeutic food formulated with Soya bean, Ragi and Green gram of 16g, 18g, and 30g respectively has attained the high levels of nutritional properties values but lower organoleptic properties. The formulation with composition of 17g of soya bean, 18g of barley and 30g of green gram has attained good nutritional values and highest acceptability in terms of hedonic rating. This formulated sample is highly preferable to adolescent girls suffering from anemia, stomach pain and nerves weakness patients as the food contains high amount of iron and the soya bean acts as the nutritional supplement to the growing adolescents.

Keywords: Therapeutic food, RDA (Required Dietary Allowances), Adolescents, Soya bean, High protein etc.

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Touchdown PCR combined with semi degenerate primers for rapid amplification of HOXD9 loci in humans

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Abstract

Higher eukaryotes possesses a large genome with a high level of gene sequence identity from other genomic DNA and is therefore difficult in assessment and time-consuming. Here we report on an efficient approach for rapid isolation and amplification of HOXD9 loci of human genome via touchdown PCR using semi degenerate primers. For the semi degenerate primers,they were designed based on conserved gene coding regions of consensus sequences. The effects of the universal primer-template matches on the efficiency of standard PCR amplification were investigated after assembly of sequences from different primers matches amplifying the same HOXD9 loci. Touchdown PCR increased both specificity and yield by high and low annealing temperatures in two consecutive amplifications on various gel concentrations. This approach was fast, easy and cost-effective for amplification of consensus sequences in very large gene sequences.

Keywords: Touchdown PCR, degenerate primers, HOXD9 loci, DNA, Genome, Consensus sequences.

INTRODUCTION

Most animal homeotic genes encode transcription factor proteins that contain a region called the homeodomain and are called Hox genes [1].HOXD9 proteins belong to a superfamily that regulates the development and control of many cellular processes [2], including proliferation [3] apoptosis [4], cell shape [5] and cell migration [6]. HOXD9 can also function as an oncogene in several cancer cells [7]. Besides their role in organizing structures along the main body axis, HoxA and HoxD cluster genes are required for proper development of both limbs and external genitalia [8]. PCR is probably the single most important methodological invention in molecular biology to date that tracks the polymorphism and evolutionary process [9]. Since its conception in the mid-1980s, it has rapidly become a routine procedure in every molecular biology laboratory for identifying and manipulating genetic material, from cloning, sequencing, mutagenesis, to diagnostic research and genetic analysis [10]. The fast and easy availability of these genes isessential for the study of functional genomics, gene expression, protein structure–function relationships, protein–protein interactions, protein engineering, andmolecular evolution [11].Primers with degeneratenucleotide positions every third base may be synthesized in order to allow for amplification of targets where only the amino acid sequence is known [12]. In this case, earlyPCR cycles are performed with low, less stringent annealing temperatures, followedby later cycles with high, more stringent annealing temperatures [13].One potential drawback to touchdown PCR is complexity of the programming on thermal cyclers and optimization of primer concentration [14]. Because of the numerous annealingtemperatures used, a large segment of the programming capacity of conventional thermal cyclers can be encumbered. Also, attempts to adjust the annealing temperaturerange can involve considerable reprogramming. Most housekeeping genes, tumor-suppressor genes, and approximately 40% of tissue-specific genes contain G+C sequences in their promoter region that were very difficult to amplify[15]. Some newer thermalcyclers avoid these problems by permitting the programming of automatic incremental temperature changes in progressive cycles [16].

MATERIAL AND METHODS

Isolation of DNA

Genomic DNA from whole blood is extracted with a combination of Proteinase K and SDS followed by protein degradation with organic reagent such as phenol and chloroform[17].Additional purification steps such as precipitation with a saturated solution of sodium chloride, rinsed in 70% ethanol and air-dried briefly and resuspended with 0.2-0.5 ml of TE buffer. DNA concentrations were determined by absorbance readings at 260 nm. All genomic DNA stocks were stored at 4^0C until further use.

Analysis of template integrity

Single-stranded integrity of a template DNA preparation is qualitatively assessed using alkaline agarose gel electrophoresis in 50mMNaCl, 1mM EDTAwith 0.3–0.5% agarose gels to visualize from 2 to > 30-kb single-stranded DNA.Gel is kept for presoak in 1X alkaline running buffer for 30 min to ensure pH equilibration. Gel is run at 0.5–1.8 V/cm (e.g., 3.5–5 h) and neutralized by gently shaking in 0.1 M Tris-HCl, pH 8.0, 1mM EDTA for 30 min, and then stained with 0.5 µg/mL ethidium bromide in TAE buffer.

T_m Predictions

The temperature at which half the molecules are single-stranded and half are double-stranded is called the $T_m$of the complex[18]. Because of the greater number of intermolecular hydrogen bonds, higher G+C content DNA has a higher $T_m$than lower G+C content DNA. Often, G+C

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Laboratory Investigation on the Strength Property of Field Collected Coal Samples

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Abstract - *The compressive strength of coal is a most troublesome property to examine by exploratory methods. This comes about not only because of coal's variability laterally as well as vertically in the seam but also because invariably it will have one set of cracks or planes of weakness and often three sets of cracks or planes of weakness approximately normal to each other, namely, face cleavage, butt cleavage and bedding planes. The knowledge of compressive strength of coal helps in the efficient extraction of coal. Since, coal belongs to the family of hard rock therefore its impact strength can be determined by the* Protodyaknov Strength Index *test. In order to perform this test in the laboratory the coal samples were collected from the field and its compressive strength was determined. In this experimental investigation it was observed that the coal having maximum compressive strength of 0.24 MPa and minimum of 0.12 MPa for the number of blows of 25 and 5 in* Protodyaknov Strength Index test set-up.

Key Words: Coal, Protodyaknov Strength Index, Compressive strength, Hard rock

1. INTRODUCTION

Rock is an aggregate of various minerals constituents which are naturally occurring. Every rock constituent having a fixed chemical composition and molecular structure. In general, the rock is composed of grains of varied polycrystalline and non-crystalline materials which are connected together either by some kind of glue or mechanical bonding [1]. Thus, we can say that rock is a firm and coherent substance which is having a non-homogenous property and it cannot be extracted by manual operation. Therefore, there is a need of an appropriate engineering principle which can help in the proper extraction of the rock mass. The principle which involves in rock engineering is called as rock mechanics.

The term rock mechanic can be described as the theoretical and applied science of the behaviour of rock. It is the that branch of mechanics which deals with the response of the rock under the force field of its environment [2-3]. In rock mechanics, the rock is not only considered as the engineering material but also the rock mechanics deals with changes in mechanical behaviour of rocks which occurred due to the engineering activities. The problems of rock mechanics are also associated with the design and stability of the rocks by determining the strength property of the rock samples. The strength property of the rock sample is called as the mechanical property of the rock sample. The strength of the rock is one of the most important mechanical property which helps in deciding the failure criteria of the rock mass during the any excavation operation.

The determination of rock mechanical property such as strength will helps the rock mechanics engineers to design the appropriate structure. There is various method available to determine the strength property of the rock. These methods may capable for measuring the different types of rock strength such as impact strength, uniaxial compressive strength (UCS), tensile strength, shear strength, point load strength etc. In the mining scenario, rock suffers mostly under the action of compressive load [4]. Due to this, the determination of compressive strength in mining scenario becomes the necessary task designing any underground or surface mines project. In this paper, an attempt has been made to study the strength of the rock samples by indirect approach. In order to determine the strength of rock by indirect approach the Protodyakonov strength index apparatus was used. In this method, the impact strength of the rock samples was determined under the laboratory environment condition [5].

Moreover, due to the impact loading on the structure the stain rate increases under the same amount of applied strength. This phenomenon affects the strength, stiffness, ductility and failure mode of the rock sample. Further, under this condition the inertia is also activated which influences the resistance and failure mode of the supporting and parent structures. The impact strength of the rock mass is the capability of the rock to withstand against the sudden applied load. The impact strength of the rock can be considered as an energy, which defines the amount of energy required to break the fracture the rock [6-7]. The impact strength of the rock depends on the type of the rock mass and it varies based on the rock type. The harder rock type having the higher amount of strain energy and vice versa. In order to determine the strength of the rock against its fracture the impact strength analysis of the rock samples becomes much necessary.

In the present study, the coal as a type of rock sample was considered for impact strength analysis. Coal is a hard rock which is the family of sedimentary rock formed from peat by the pressure of rock laid down later on top. In this paper, the impact strength analysis of both the selected rock was carried out by Protodyakonov strength index test apparatus.

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Bio-Active Phenylacetic Acid Complexes: Synthesis, Structure And Antimicrobial Activities

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ABSTRACT

Cu(II) complexes due to their coordination properties and their biological activity these act as good chelating agents and have high pharmacological potential. Cu (II) with phenyl acetic acid and azide have been synthesized and characterized by IR, LC-MS, TG-DTA and UV confirms the coordination of ligands by oxygens of phenyl acetic acid and nitrogens of azide ligands. Complex is screened for anti microbial activity.

KEY WORDS: Phenyl acetic acid, Antimicrobial Activity.

1. INTRODUCTION

Coordination of metal with organic compounds causes drastic change in the properties of metal and ligand. Phenyl acetic acid and its derivatives are of much interest because of their biological activities. Phenyl acetic acid a type of plant hormone, and an active auxin molecule which plays a vital role in coordination of many growth and behavioural processes in the life cycle of plants. They have antibacterial activity against micro organisms. Pseudo halide ions like azides, thiocyanates, isocyanates are versatile ligands that can bind divalent metal ions (Cu^{2+}, Mn^{2+}, Co^{2+} and Ni^{2+}) in a variety of ways of connecting transition metals in the solid state.Coordination of organic comopounds with metal causes drastic change in the biological property of the ligand and also the metal moiety.

2. MATERIAL AND METHODS

IR spectra are obtained with a Shimadzu IR Prestige 21 FT-IR spectrophotometer. Electronic spectra are recorded on LABINDIA UV3000$^+$ UV /VIS spectrophotometer. LC-MS spectra are recorded on AGILANT QQQ (ESI-MS). Massspectrometer. TG-DSC spectra are obtained using SDT Q600 V20.9 BUILD 20.

Synthesis of [Cu $(PAA)_3(N_3)_2$] (1): An aqueous (5 ml) solution of Copper perchlorate hexahydrate (0.185g, 0.5 mmol) is added to an methanolic solution (10ml) of Phenyl acetic acid (0.068g, 0.5 mmol) under stirring conditions at 60^{0}C, blue solution is formed and then aqueous solution (5 ml) of NaN_3 (0.03 g, 1.0 mmol) is added which turned to parrot green solution. After constant stirring at 60^{0}C temperature for 30 minutes, the solution turned to greenish blue. The solution is filtered off, greenish blue precipitate is formed. The precipitate was washed with methanol to remove uncoordinated ligands. Yield is 0.168 g (59.4%). Anal.expt $C_{26}H_{24}CuN_6O_6$, Mol.Wt. 580.05, C 53.84, H 4.17, N 14.49 (observed) C 53.62, H 4.12, N 14.20 (calculated). Important IR bands (KBR disc cm^{-1}) 3569, 2145, 1634, 1298 cm^{-1}. Mass Peak (m/z): 416, 485, 551, 617.

IR Spectrum of [Cu$(PAA)_3(N_3)_2$]: The Infrared spectrum exhibited bands in regions 3344, 3450cm^{-1} due to C=O of the free ligand. These bands are shifted to higher frequency 3569 cm^{-1}on complexation with Cu(II). The C=O stretching in the infrared spectrum ofPhenylacetic is assigned to the very intense infrared band observed at 1634cm^{-1} another intense band observed at 660cm^{-1} in the IR spectrum of Phenylacetic acid is assigned to a ring stretching deformation. However the $\nu_{as}(N_3)$ modes appeared as strong peaks at 2051cm^{-1} respectively. The shift to higher frequencies of $\nu_{as}(N_3)$ bandat 2145cm^{-1} indicates the end-on bridging mode of azide. In addition, the$\nu_s(N_3)$ modes appeared as a weak band at 1298 cm^{-1} also indicates the terminal nature of azido group. Important peaks reported in table.1.

Table.1. IR Spectrum of [Cu$(PAA)_3(N_3)_2$]

Complex	ν C=O	$\nu_{as}(N_3)$	Terminalazido group
	3344,3450cm^{-1}	2051cm^{-1}	1298 cm^{-1}

LC-MS Spectrum of [Cu $(PAA)_3(N_3)_2$]: Peak at 416 (m/z) is complex bound to two Phenylacetic acid and two azideions refer to [Cu$(PAA)_2(N_3)_2$]. Peak at 485(m/z) at complex bound to fragments of two Phenylacetic acid and two azideions. Peak at 551 (m/z) is complex bounded to three Phenylacetic acid and two azide ions refer to [Cu$(PAA)_3(N_3)_2$]. Peak at 617(m/z) corresponds to Cu bound to fragment of four PAA fragment and azide ions.

Electronic Spectrum of [Cu $(PAA)_3(N_3)_2$]: The UV-VIS spectrum of the metal complexes is recorded in DMSO solution in the wavelength range 200–800 nm.The UV-VIS spectrum of Cu(II) complex displays a broad band at 360nm attributable to d-d transition, which is compatible with complexes having square pyramidal structure. Important absorption band reported in table.2.

Table.2. Electronic Spectrum of [Cu$(PAA)_3(N_3)_2$]

Complex	Absorbance	μ/cm^{-1}	Assignment
	360	320	d-d

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COMPARATIVE STUDY OF THE STRENGTH PROPERTIES OF THE CONCRETE WITH PARTIAL REPLACEMENT OF THE COARSE AGGREGATE WITH PUMICE AND OVER BURNT BRICKS

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ABSTRACT

Concrete is the universally accepted material for its adverse properties with high usage of the concrete for all type of the works in the world, it leads to depletion of natural resources like river sand, and granite. Which are the components of the concrete as fine aggregate and coarse aggregate in this project M30 grade concrete is taken in which 10%,20%&30% of coarse aggregate is replaced with over burnt bricks and 10%,20%and 30% of coarse aggregate replaced with pumice by volume. And the compressive, flexural and split tensile strength properties at 7,28& 56 days and the unit weights of the concrete compared. In order to safe guard the natural resources, alternate material like over burnt bricks, pumice considered in the present project.

INTRODUCTION

Light weight concrete

Structural lightweight concrete has an internal density (unit weight) of 1440 ~ 1840kg / m3 compared to normal weight concrete with density of 2240 ~ 2500kg / m3. For structural use, the concrete strength must be at least 17.0 MPa. The concrete mixture is made of lightweight coarse aggregate. In some cases, some or all of the micro aggregates may be lightweight products. Lightweight aggregate used in structural lightweight concrete is a lightweight shale, clay or slate pumice material usually fired from a rotary furnace to develop a porous structure. Other products such as air-cooled blast furnace slag and hematite are also used. There is a different class of unstructured lightweight concrete made from other aggregate materials and with higher air voids in cement paste matrices (eg cellular concrete). These are typically used for insulation properties. The main use of structural lightweight concrete is to reduce the dead load of concrete structures, and structural designers can reduce the size of pillars,

foundations and other load bearing elements. Structural lightweight concrete mixtures can be designed to achieve similar strength to normal weight concrete. The same is true for other mechanical and endurance performance requirements. Structural lightweight concrete provides more efficient strength-to-weight ratio of structural elements. The mild cost of most lightweight concrete is offset by a reduction in the size of the structural members, reinforcement of the steel and reduction in the volume of concrete, thus reducing overall costs.

Over burnt bricks

Bricks are the most important part of development work and are used by humans for a long time. Its history dates back to the earliest times of human civilization. Many world-renowned archaeological excavations provide a wealth of information on brick usage in many parts of the world. A few years ago, bricks were made in warm places and hardened with simply sunlight. The sun-dried mud-brick hand was made and used in pre-porcelain neolithic times. The oldest brick use case was first discovered in southern Turkey. The Sumerian palace in Kish, Mesopotamia, is another excellent example of the use of ancient bricks.

The brick burned in the 5th century BC was used as part of the city of Babylon. The ancient Egyptians also used sun-dried clay bricks in world-famous sites. During the Roman Empire, the use of bricks spread throughout Europe spreading to Italy and the Byzantine area. 11th

In the development work, the use of blocks spread from this land. After the great fire in London in 1666, the city was rebuilt with most of the block structures. Bricks in the United States have been used in Virginia since 1611, and Sundried bricks have been made and used