Knowledge-Based Morphological Deep Transparent Neural Networks for Remote Sensing Image Classification

Dasari Arun Kumar, *Senior Member, IEEE*

***Abstract*—Land use/land cover classification of remote sensing images provide information to take efficient decisions related to resource monitoring. There exists several algorithms for remote sensing image classification. In the recent years, Deep learning models like convolution neural networks (CNNs) are widely used for remote sensing image classification. The learning and generalization ability of CNN, results in better performance in comparison with similar type of models. The functional behavior of CNNs is unexplainable because of its multiple layers of convolution and pooling operations. This results in black box characteristics of CNNs. Motivated with this factor, a CNN model with functional transparency is proposed in the present study. The model is named as Knowledge Based Morphological Deep Transparent Neural Networks (KBMDTNN) for remote sensing image classification. The architecture of KBMDTNN model provides functional transparency due to application of morphological operators, convolutional and pooling layers, and transparent neural network. In KBMDTNN model, the morphological operator preserve the shape/size information of the objects through efficient image segmentation. Convolution and pooling layers are used to produce minimal number of features from the image. The operational transparency of proposed model is coined based on the mathematical understanding of each layer in the model instead of randomly adding layers to the architecture of model. The transparency of proposed model is also because of assigning the initial weights of NN in output layer of model with computed values instead of random values. The proposed KBMDTNN model outperformed similar type of models as tested with multispectral and hyperspectral remote sensing images. The performance of KBMDTNN model is evaluated with the metrics like overall accuracy (OA), overall accuracy standard deviation (OA_{STD}), producer's accuracy (PA), user's accuracy (UA), dispersion score (DS), and kappa coefficient (KC).**

***Index Terms*—Deep neural networks, granulation, knowledge encoding (KE), morphological operators, remote sensing image classification.**

I. Introduction

LAND use/Land cover classification of remote sensing images provides information about the resources on the earth surface [1]. Availability of remote sensing images of various dimensionality in terms of spatial, spectral resolutions and temporal resolutions paved path for the origin of automated models to classify the images. The automated models such as statistical models are used for remote sensing image classification. The traditional statistical models like Baysian classifier depend on the statistical distribution of samples/pixels. In most of the remote sensing applications, the image data is not statistically well distributed. In the past decade, machine learning (ML) models are popularly used for image classification. The advantages of machine learning models are due to learning and generalization ability. Also, ML based classifiers produces better classification results with unevenly distributed data. The basic classifiers such as decision trees, random forests, K-nearest neighbour, minimum distance to mean, Bayesian classifier are used to classify the small size images on pixel by pixel approach. The performance of basic classifiers is not significant in large size images with multiple number of classes. With this motivation, advanced ML models such as neural networks (NNs), support vector machines (SVM), and genetic algorithms (GA) are widely used for image classification [2]. The learning and generalization ability of NNs can acquire the information from large size data during the training process [3]. The combination of GA and SVM was proposed by Salehi *et al.* [4] for urban land cover classification using Radarsat-2 PolSAR images. The model outperformed SVM and Wishart model in SAR image classification. The superiority of model is due to three important steps such as feature extraction, feature selection, and image classification in GA+SVM model. The performance of ML models is significant in classifying the images of temporal resolutions. Satalino *et al.* [5] used Kittler–Illingworth method to classify temporal SAR remote sensing data. ML models are also widely used in nonremote sensing image classification. Some of the major applications of ML models in other diversified fields include traffic signals detection [6], brain image classification [7], human pose estimation [8], pathological studies [9], multiple sclerosis (MS) disease detection in magnetic resonance images [10], tea category identification [11], text classification in images [12].

The ML based methods such as NNs work on pixel by pixel based approach during the image classification. The pixel based approach is confine to only minor details in the image. In the recent years, convolutional neural networks (CNNs) with object based image classification approach were proposed to overcome the limitations of pixel based NN model. The CNNs considers both major and minor level details of objects in the image during the classification stage. Due to this reason, CNNs performs better than NNs in image classification. CNNs

Manuscript received August 8, 2021; revised November 3, 2021; accepted February 8, 2022. Date of publication February 14, 2022; date of current version March 16, 2022. This work was supported by Kandula Sreenivasa Reddy Memorial College of Engineering through seed funded project 2021.

The author is with the Kandula Sreenivasa Reddy Memorial College of Engineering, Kadapa 516003, India (e-mail: arunkumar.mtech09@gmail.com).

Digital Object Identifier 10.1109/JSTARS.2022.3151149

Received: 20 May 2021 | Accepted: 12 June 2021
DOI: 10.1111/exsy.12793

ORIGINAL ARTICLE

Expert Systems WILEY

Image super resolution model enabled by wavelet lifting with optimized deep convolutional neural network

Achukatla Valli Bhasha[1] | Balam Diguvathattu Venkatramana Reddy[2]

[1]ECE Department, JNTUA, Ananthapuramu, India

[2]ECE Department, Sir Vishveshwaraiah Institute of Science & Technology, Madanapalle, India

Correspondence
Achukatla Valli Bhasha, ECE Department, JNTUA, Ananthapuramu, Andhra Pradesh, India.
Email: vbksrmce@gmail.com; valli@ksrmce.ac.in

Abstract

This paper plans to develop an intelligent super resolution model with the linkage of Wavelet lifting scheme and Deep learning algorithm. Before initiating the resolution procedure, the entire HR images are converted into Low Resolution (LR) images using bicubic interpolation-based downsampling and upsampling. Further, the Wavelet lifting scheme helps to generate the four subbands of each image like LR wavelet Sub-Bands for LR images, and High Resolution (HR) wavelet Sub-Bands for HR images. The residual image is generated by taking the difference between the LR wavelet Sub-Bands and HR wavelet Sub-Bands images. The proposed model involves two main phases: Training phase and Testing. The training phase trains the residual image of all images by Deep Convolutional Neural Network with LR wavelet Sub-Bands as input and residual image as target. On the other hand, in testing phase, the LR wavelet Sub-Bands query image is subjected to Deep Convolutional Neural Network, which outputs the concerned residual image. This generated residual image is summed with LR wavelet Sub-Bands image, followed by inverse wavelet lifting scheme to obtain the final super resolution image. The main contribution of this paper is to improve the conventional Deep Convolutional Neural Network by optimizing the number of hidden layer, and hidden neurons using modified Whale Optimization Algorithm called Average Fitness Enabled Whale Optimization Algorithm by considering the objective of maximizing the Peak Signal-to-Noise Ratio. Finally, the proposed method achieves an improved quality of the results which is comparable the existing models.

KEYWORDS
average fitness enabled whale optimization algorithm, deep convolutional neural network, high resolution image, image super resolution, low resolution image, wavelet lifting scheme

1 | INTRODUCTION

Nowadays, high resolution (HR) images are playing a key role in several image applications like medical diagnosis, remote sensing and surveillance video and pattern recognition (Wang et al., 2016; Yue et al., 2016). Owing to the limitations of storage devices and image acquisition in a few

Abbreviations: AD, average difference; ADMM, alternating direction method of multipliers; AF-WOA, average fitness enabled whale optimization algorithm; CSR, convolutional sparse representation; Deep CNN, deep convolutional neural network; DOG, difference of Gaussian; DWSR, deep wavelet super-resolution; FF, FireFly; FMISR, fast medical image super resolution; GWO, grey wolf optimization; HA, high average; HD, high diagonal; HH, high horizontal; HR, high resolution; HRSB, HR wavelet sub-bands; HV, high vertical; IBP, iterative back projection; LA, low average; LD, low diagonal; LH, low horizontal; LISTA, learned iterative shrinkage and thresholding algorithm; LR, low resolution; LRSB, LR wavelet sub-bands; LV, low vertical; LWSR, lifting wavelet-based super-resolution; PAN, panchromatic; POCS, projection onto convex sets; PSNR, peak signal-to-noise ratio; PSO, particle swarm optimization; REPS-SR, smoothing super-resolution; SISR, single frame image super-resolution; SSIM, structural similarity index; VDSR, very-deep super-resolution; WOA, whale optimization algorithm.

ISSN 1061-8309, Russian Journal of Nondestructive Testing, 2021, Vol. 57, No. 11, pp. 1027–1038. © Pleiades Publishing, Ltd., 2021.

THERMAL METHODS

Enhanced Subsurface Analysis Using Proper Orthogonal Decomposition in Nonstationary Thermal Wave Imaging

G. T. Vesala[a, c, *], V. S. Ghali[a], Sk. Subhani[b], and B. Suresh[a]

[a] *Infrared imaging center, Koneru Lakshmaiah Educational Foundation, Vaddeswaram, Andhra Pradesh, India*

[b] *Department of Electronics and Communication Engineering, PACE Institute of Technology and Science, Ongole, A.P, India*

[c] *Department of ECE, KSRM College of Engineering, Kadapa, A.P, India*

**e-mail: gopitilak7@gmail.com*

Received August 21, 2021; revised October 1, 2021; accepted October 8, 2021

Abstract—Active infrared thermography (AT) has been evolved as a prominent nondestructive testing technique for in-situ monitoring of defect-free composite material manufacturing. The recent past witnessed the growth of low peak power nonstationary thermal wave imaging schemes to provide a promising axial and spatial resolution to cater for these requirements. The present article employs a proper orthogonal decomposition (POD) for the processing of quadratic frequency modulated thermal waves intended to enhance the detection of subsurface anomalies by using selective mode consideration. The performance of POD is experimentally validated over carbon fiber and glass fiber reinforced plastic specimens with artificially created flat bottom holes and Teflon inclusions considered to be the subsurface anomalies. Further, the enhanced defect detection capabilities of POD are qualitatively assessed using signal-to-noise ratio and size of defects as a figure of merit.

Keywords: nondestructive testing, nonstationary thermal wave imaging, proper orthogonal decomposition, carbon fiber reinforced plastic, phase analysis

DOI: 10.1134/S1061830921110103

INTRODUCTION

Active thermography (AT) has become a viable nondestructive testing (NDT) modality in composite inspection due to its noncontact, noninvasive, safe, remote and wide-area inspection capabilities. In AT, a controlled optical stimulus is imposed over the test object that generates a similar thermal perturbation over the surface, which is further propagated into subsurface layers as diffusive thermal waves. Being impeded by the thermal inhomogeneity of subsurface anomalies, these diffusive thermal waves travel back, resulting in a thermal contrast over the surface. These temporal thermal contrast maps are captured using an infrared camera and further processed for qualitative and quantitative analysis of subsurface anomalies [1]. Various stimulation mechanisms have evolved in infrared thermography to provide a detailed subsurface analysis, among which nonstationary stimulations are gaining interest due to their low power and depth scanning capability with single experimentation from various processing approaches facilitating better depth resolution as well [2–7].

Short duration and high peak power-based stimulus in pulse thermography (PT) and mono-frequency and moderate peak power-based stimulus in lock-in thermography (LT) are widely used AT approaches. In PT, the thermal response during the cooling phase of the test sample is recorded and further analyzed for subsurface anomaly detection and characterization [2]. However, the high peak power stimulus induces nonuniform emissivity and nonuniform radiation from the test sample, limiting its application. LT overcome this disadvantage by probing the equivalent energy of PT through a low peak power optical source using a low-frequency periodic stimulus for an extended period. Further, the transient thermal response is analyzed using Fourier transform-based phase analysis [3]. LT reveals the subsurface details up to a specific depth only and requires repeated investigation with different loading frequencies to scan through the entire test sample thickness. Later, pulse phase thermography (PPT) has been introduced by combining the stimulation in PT and the processing technique in LT [4].

Nonstationary thermal wave imaging techniques have evolved in the recent past to surpass the limitations of conventional stimulation schemes (high peak power stimulation and repeated experimentation),

DOI: 10.1784/insi.2021.63.12.XXX

Material characterisation by enhanced resolution in non-stationary thermal wave imaging

G T Vesala, V S Ghali, S Subhani and Y Naga Prasanthi

In the recent past, quadratic frequency-modulated thermal wave imaging (QFMTWI) has been advanced with a chirp z-transform (CZT)-based processing approach to facilitate enhanced subsurface anomaly detection, depth quantification and material property estimation with enhanced depth resolution. In the present study, the applicability of CZT-based phase analysis for foreign object defect detection in a structural steel sample using QFMTWI is validated through finite element-based numerical modelling rather than experimental verification due to limited available resources. Furthermore, the enhanced defect detection capability of the CZT phase approach is qualitatively compared with the frequency- and time-domain phase approaches using the defect signal-to-noise ratio (SNR) as a quality metric. Also, an empirical relationship between the observed phases and the thermal reflection coefficient is obtained, which recommends the CZT phase as a prominent approach for foreign material defect detection.

Keywords: foreign material inclusion detection, QFMTWI, CZT phase, frequency-domain phase, time-domain phase.

1. Introduction

Defect detection and characterisation in industrial objects without impairing their future usefulness is challenging and various non-destructive testing and evaluation (NDT&E) techniques have been introduced to achieve this. Among the various non-destructive testing techniques, active thermography has evolved as a viable approach due to its low cost and its non-contact, quick, reliable and wide-area inspection capabilities[1-7]. The object under test is exposed to a controlled optical stimulus in active thermography, followed by capturing the thermal response using an infrared imager and further processing it for defect detection. Among the various optical excitation techniques, pulsed thermography, lock-in thermography (LIT) and pulse phase thermography are widely used active thermography approaches in industrial applications due to their simple and well-established procedures[1-3]. However, the high peak power sources used in pulsed thermography and the prolonged experimentation in LIT can be replaced by low peak power and frequency-coded stimulation schemes that project multiple frequencies in a single experiment[4,5].

Using an optical stimulus with low peak power modulated with a band of low frequencies in linear frequency-modulated thermal wave imaging (LFMTWI) can overcome the limitations of conventional pulsed thermography and LIT[4]. The low-frequency band helps the thermal waves to diffuse at different depths in the test sample and allows the entire thickness to be scanned in a single experiment with enhanced defect detection and depth resolution. On the other hand, the non-linear counterpart of LFMTWI, called quadratic frequency-modulated thermal wave imaging (QFMTWI), has shown greater depth probing of the thermal waves, contributing to an even more enhanced resolution for deeper defects[5]. The limitations associated with the Fourier transform in non-stationary signal analysis restrict the applicability of QFMTWI for qualitative and quantitative investigation[7]. However, the cross-correlation-based time-domain phase and the enhanced spectral zooming featured in chirp z-transform (CZT)-based phase approaches have proven to overcome the limitations associated with Fourier transform-based phase analysis in QFMTWI[6-10]. The time-domain phase is a multi-transform technique that results in an emissivity-normalised contrast parameter with enhanced dynamic range and higher sensitivity[6-8]. On the other hand, the CZT presents an enhanced spectral resolution by zooming into a selected band of frequencies that have been proven to provide enhanced depth resolution, depth quantification and thermal property estimation in the recent past[9-11].

The temporal thermal evolution of a subsurface defect is dependent on multiple factors, such as defect depth, size and the type of material included. Chen *et al*[12] and Zeng *et al*[13] individually analysed the characteristic variations in thermal signal reconstruction curves of pulsed thermography for different foreign material inclusions (water and oil) in a honeycomb structure. In the recent past, Arora *et al*[8] applied the cross-correlation and phase-based processing techniques of frequency-modulated thermal wave imaging (FMTWI) to detect different oxidising material (slag) inclusions in a structural steel sample through numerical analysis. Hu *et al*[14] and Duan *et al*[15] individually addressed the advancements in automatic defect detection through an artificial neural network (ANN) and a long short-term memory (LSTM) network to classify various types of defect in honeycomb and structural steel samples using pulsed thermography. Similarly, QFMTWI is being advanced with ANN, decision tree, convolutional neural network (CNN) and proximity-driven one-class classification approaches for automatic defect detection[16-19].

This novel study highlights the applicability of CZT phase analysis in QFMTWI for foreign material inclusion detection in a

Submitted 16.03.21 / Accepted 12.10.21

Gopi T Vesala and Venkata Subbarao Ghali are with the Infrared Imaging Center, Department of Electronics and Communication Engineering, Koneru Lakshmaiah Educational Foundation, Vaddeswaram, Andhra Pradesh, India.

Shaik Subhani is with the PACE Institute of Technology & Sciences, Ongole, Andhra Pradesh, India.

Y Naga Prasanthi is with the Dhanekula Institute of Engineering and Technology, Ganguru, Vijayawada, Andhra Pradesh, India.

PAPER

A Techno-Economic Feasibility Analysis of Renewable Energy-Based Marine Micro-Grid for Cruise Ship Applications: A Case Study Simulation

AUTHORS

Murugaperumal Krishnamoorthy
Department of EEE, Bharat Institute of Engineering and Technology

Satheeshkumar Packirisamy
Department of EEE, Mailam Engineering College

Muqthiar Ali Shaik
Department of EEE, Annamacharya Institute of Technology and Sciences

Amaresh Karanam
Department of EEE, KSRM College of Engineering

Arulselvi Ramasamy
Department of CSE, Bharat Institute of Engineering and Technology

Marlin Sagayaraj
Department of EEE, Bharat Institute of Engineering and Technology

ABSTRACT

This article mainly deals with the design and developments of marine micro-grid for cruise ship applications. The incorporations of the solar PV array with existing fossil-fuel–based generators and the replacement of an engine-based propulsion system into the electric propulsion system have shown enormous improvements in the technical performance and optimal operations of the system. The proposed hybrid marine micro-grid (HMMG) system design and development has created more influences on the system investment flows and environmental pollutant mitigation. Here, the hybrid micro-grid model has been developed with necessary multi-objective functions and operating constraints. The optimum techno-economic feasibility analysis has been carried out with an energy-balanced loss of load probability algorithm, which proved that the planned energy management system has a highly commendable and efficient configuration to achieve good system performance with viable economics for a sustainable energy society.

Keywords: design of marine micro-grid system, electric propulsion system, techno-economic feasibility analysis, optimum sizing and performance, sustainability developments

Introduction

The high usage of fossil fuel energy could create a lot of visible damage to the environment. Alternative energy production technologies such as solar, wind, and biomass energies can mitigate these issues and promote sustainability (Farid, 2016; Jin et al., 2016; TFRI, 2015). Existing cruise ships' energy requirements were mainly supplied by conventional energy technology. Here, the approach is sharing the energy demand of cruise ships among traditional and renewable resources. The electric power supply to the cruise ship based on a hybrid energy modeling approach (Ghenai et al., 2019) has been attempted as a case study on Sweden ships. The significant energy utilization has been taken from the diesel engine and reduced environmental pollution by 9.8% due to the enhancement of renewable energy sources. A novel approach to reduce ships' energy consumptions during harbor stays (Yuan et al., 2020) has suggested developing a waste heat recovery technology through an organic Rankine cycle.

A novel approach to reduce ships' energy consumptions during harbor stays (Chen et al., 2020) exists with a super-capacitor–based energy storage system. Also, the corresponding system performance, storage capability, and inherent power quality issues have been verified. The different battery chemistries' behavior with a hybrid renewable energy (HRE) electrification system for residential applications (Krishnamoorthy et al., 2020) has been characterized by real village case studies and includes the techno-economic analysis terms of life cycle cost and backup system anatomy. An HRE electrification system for residential

Received: 30 July 2021 | Revised: 10 September 2021 | Accepted: 21 September 2021

DOI: 10.1002/cta.3153

SCIE 6

ORIGINAL PAPER

WILEY

A new design of transformerless, non-isolated, high step-up DC-DC converter with hybrid fuzzy logic MPPT controller

Chakarajamula Hussaian Basha | **Matcha Murali**

Department of Electrical and Electronics Engineering, K.S.R.M. College of Engineering (Autonomous), Kadapa, Andhra Pradesh, India

Correspondence
Chakarajamula Hussaian Basha, Department of Electrical and Electronics Engineering, K.S.R.M. College of Engineering (Autonomous), Kadapa. Andhra Pradesh, India.
Email: sbasha238@gmail.com

Abstract

Under Partial Shading Conditions (PSCs), the solar PV nonlinear characteristics consist of multiple Maximum Power Points (MPPs). As a result, it is very difficult to extract the peak power of the solar PV. In this article, an Improved Grey Wolf Optimization-based Fuzzy Logic Controller (IGWO-FLC) is proposed to track the MPP of the solar PV. The advantages of the proposed hybrid soft computing Maximum Power Point Tracking (MPPT) controller are high accuracy, very less oscillations across MPP, and high tracking speed. Also, a new transformerless, high step-up, Non-isolated Boost Converter (NIBC) is introduced in this work to improve the voltage profile of the solar PV system at different atmospheric conditions. The introduced converter circuit makes use of the network LC^3D^3 to improve the voltage conversion ratio, reduced voltage stress on switches, and universal input voltage. In addition, the network LC^3D^3 acts as a filter to reduce the output power ripples of the converter. The steady-state performance of the proposed converter is analyzed at Continuous Conduction Mode (CCM) and Discontinuous Conduction Mode (DCM) of operations. The MATLAB/Simulink window is used to validate the proposed PV fed NIBC system at uniform and different PSCs of the solar PV. Also, the NIBC performance is investigated by applying an M62252P8020 type programmable DC-source.

KEYWORDS

boost converter, duty cycle, fuzzy logic, GWO, high MPP tracking speed, high step-up, transformerless, universal input voltage

1 | INTRODUCTION

Among the multiple revolutionary events that happened over the past few decades, electrification of the Electric Vehicle (EV) played an inevitable role in overcoming the usage of non-renewable sources mediated environmental pollutions. The foremost aim of electrification is emission-free transportation. Additionally, EV charging stations were established globally further reduced the usage of thermal power generation.[1] In order to overcome the inefficiency of grid-connected electric vehicle (EV) in pollution control, our current work focusses on introducing renewable energy powered EV. The renewable energy sources are solar, wind and tidal, etc. Among all of the renewable resources, solar is the most popular renewable energy source because its advantages are excess availability in nature, free of cost, and fully flexible.[2] In addition, the solar PV systems do not consist of any rotating parts. As a result, conduction and heating

The Sparrow Search Algorithm for Optimum Position of Wind Turbine on a Wind Farm

K. Kalyan Kumar*‡, G. Nageswara Reddy**,

* *Research Scholar, YSR Engineering College of Yogi Vemana University, Proddatur, Andhra Pradesh, India.*

** *Department of Electrical & Electronics Engineering, YSR Engineering College of Yogi Vemana University, Proddatur, Andhra Pradesh, India.*

(kalyankumark13@gmail.com, gnageswarareddy@gmail.com)

‡ Corresponding Author; K.Kalyan Kumar, Research Scholar, YSR Engineering College of YVU, Proddatur, Andhra Pradesh, India.Tel: +91 9492070084, kalyankumark13@gmail.com

Received: 29.08.2021 Accepted:07.10.2021

Abstract- With more Renewable Energy (RE) integration in recent years, Wind farms (WFs) seem to produce more energy from Wind Turbines (WTs). Most WTs in WFs are designed to face a predetermined wind direction; this means that WTs can generate less electricity than they need due to the intermittent nature of the wind. Due to the non-linear nature of wind energy, optimization techniques are critical for successfully building a wind farm. This process involves performing layout optimization techniques using soft computing. WFs have a construction configuration with multiple turbines situated near together in a restricted terrain, contributing to higher energy losses due to the wake effects. Therefore, WTs on a WF to enhance the generated energy while meeting all constraints are pretty restrictive and complicated. We utilized the newly developed Sparrow Search Algorithm (SSA) to determine the most effective technique for the optimal positioning of WTs in WF. We can obtain the high efficiency of the WTs at the lowest possible level of turbine output. This article examined two case studies: the first one is a Constant Wind Speed (CWS) with Variable Wind Direction (VWD); the second one is a Variable Wind Speed (VWS) with Variable Wind Direction (VWD). It was determined how well the proposed method performed compared to the bulk of prior research that dealt with the same problem. Consequently, SSA is an effective technique for determining the WT position allocation problem to achieve the optimum position.

Keywords Wind Farm Power, Wind Turbine Positioning, Location Optimization, Sparrow Search Algorithm.

1. Introduction

Electricity is an integral part of the earth and forms the basis of all industrial, scientific, transportation, and communication activities, especially present and future. Electricity consumption is increasing enormously, but conventional supplies are becoming scarcer, prompting many academics to look for new energy sources. RE, particularly solar and wind energy, is becoming more prominent and attractive as a technological alternative. Renewable Energy Sources (RES) are being utilized in this area to decrease reliance on conventional energy sources due to the many advantages of RES, including reduced carbon emissions and hazardous gas emissions. Wind energy is among the most efficient forms of electricity generation. WTs are among the most accessible energy supplies available globally due to the stability, environmental friendliness, and affordable character of RES. It will be possible to meet future energy demand by converting wind energy into electrical energy. The efficiency of WTs is relatively poor if WTs are properly not installed in the correct location. So, the construction of WF is meticulous, and thorough work is required.

The best location of WT is important in WF design. An improper WF design contributes to a negative impact of the wake effect of lowering harvested electrical energy. Wake effect caused by upstream WT, which reduces downstream WT speed. As a consequence, downstream WT harvested energy is less in comparison with upstream WT harvested energy. The traditional WTs layout considerably enhances the wake effect; thus, the optimal location of WT inside WF may be an ideal solution for reducing the wake effect and strengthening the WF performance by increasing the collected energy of the WTs. As a result, researchers have taken a

Analysis of Microgrid System with Photovoltaic Array

K.Ramamohan Reddy[1] , N.Siddhik[2], A.Jyothirmayi[3], K.Kalyan Kumar[4]

[1,2,3,4] K.S.R.M College of Engineering (Autonomous)

[1]ramamohanreddy2020@gmail.com, [2]kkr.siddhu@gmail.com , [3]a.jyothirmayi8@gmail.com
[4]kalyankumark13@gmail.com

Abstract. As the modern power system is advancing, new challenges are coming in to picture. The micro-grid concept along with renewable energy PV systems is emerging as a key factor for the long-term doable solution for future energy sector requirements. Micro-grid can have distributed energy resources like PV panels, wind turbines, Geothermal Tidal energy & power generators that produce power.Controlling and protection are the main problems that need to be handled in microgrid operation. Microgrids need to provide multiple end user needs simultaneously. For example, electricity generation, heating and cooling. This paper accords with the analysis of a Microgrid system connected with a PhotoVoltaic array.

1. Introduction

Now a days electrical power is the prominent source for many of the electrical equipment. For the generation of electrical power renewable energy source and Non-Renewable Sources are the main resources. Among these two Non-renewable energy sources are widely used for the generation of electricity till date. But as the resources for Non-renewable sources are diminishing and their impact on environment conditions are more, now days the focus on the Renewable energy sources usage for the generation of electrical energy is increasing. These inexhaustible energy sources are Solar, wind, tidal, hydro and geothermal etc., These resources are intermittent and not continuous. Out of these solar energy plays a major role for the power generation. Solar energy production is going to have more focus because of no fuel cost. The power generated with the photovoltaic cells is called solar power generation. With usage of solar insolation the DC power can be generated. By arranging the PV cells in a proper order a PV module will be developed. Set of PV modules is called an array. With the help of these PV Arrays we can increase the capacity of the power generation.

2. Photovoltaic connected microgrid- Line Diagram

Photovoltaic connected microgrid- Line Diagram is shown in figure-1

IEEE Access
Multidisciplinary | Rapid Review | Open Access Journal

Received October 9, 2021, accepted October 19, 2021, date of publication October 26, 2021, date of current version November 4, 2021.

Digital Object Identifier 10.1109/ACCESS.2021.3123153

Energy Conservation Approach for Continuous Power Quality Improvement: A Case Study

LALITH PANKAJ RAJ NADIMUTHU[1], KIRUBAKARAN VICTOR[1], CHAKARAJAMULA HUSSAIAN BASHA[2], T. MARIPRASATH[2], C. DHANAMJAYULU[3], (Senior Member, IEEE), SANJEEVIKUMAR PADMANABAN[4,5], (Senior Member, IEEE), AND BASEEM KHAN[6], (Senior Member, IEEE)

[1]Centre for Rural Energy, The Gandhigram Rural Institute (Deemed to be University), Chinnalapatti, Tamil Nadu 624302, India
[2]K. S. R. M. College of Engineering (Autonomous), Kadapa, Andhra Pradesh 516003, India
[3]School of Electrical Engineering, VIT University, Vellore 632014, India
[4]CTIF Global Capsule, Department of Business Development and Technology, Aarhus University, 8000 Aarhus, Denmark
[5]Renewable Energy Laboratory (REL), Communication and Networking Department, Prince Sultan University, Riyadh 11586, Saudi Arabia
[6]Department of Electrical and Computer Engineering, Hawassa University, Awassa 1530, Ethiopia

Corresponding authors: Kirubakaran Victor (kirbakaran@yahoo.com) and Baseem Khan (baseem.khan04@ieee.org)

ABSTRACT This work focused on a harmonic mitigating filter and investigated the effect of the harmonic mitigating filter in the textile industry with innovative energy conservation strategies for energy bill reduction, which covers a pathway to climate change mitigation. Here, the effect of the harmonic filter is found out by the systematic energy audit methodology (Preliminary, Detailed and Post-Audit phase). From the energy auditing, it has been found that the textile industry needed a passive harmonic filter for harmonic mitigation. Since, third, fifth, and seventh order of harmonic predominantly exists in the system. The high stability at higher current, known tuning frequency, low cost and low power consumption makes the passive filter to be the best fit for the system. The voltage and current Total Harmonic Distortion Factor (THDF) have been measured using the class 'A' power quality and energy analyzer. The harmonic filter's effect in harmonics mitigation is prominent; 66.45% of the reduction of current harmonics which is achieved after installing the passive filter at the Point of Common Coupling (PCC) of the system. Also, the reduction of harmonics ensures energy conservation through the reduction of additional losses (joule, copper and eddy current losses). The techno-economic analysis with payback period calculation is carried out and reported. Also, the effect of harmonics like mechanical anomalies (temperature rise) is carefully studied using an infrared thermo graphic technique in the textile industry's motor loads. The energy conservation and their carbon emission reduction are calculated and reported.

INDEX TERMS Carbon emission reduction, energy audit, energy conservation, harmonic mitigation, passive mitigation techniques, and power quality.

I. INTRODUCTION

According to the Energy Conservation Act of India, the textile industry is conserved as one of the highly energy-intensive industries. India is the third-largest textile exporter in the global arena. In India, the textile industry contributes 2% of the country's Gross Domestic Product (GDP) and 12% of export earnings. According to the India Brand Equity Foundation (IBEF), the Indian textile market's size is expected to touch the US $223 by 2021, growing at a Compound Annual Growth Rate (CAGR) of 10.23% over 2016. The growth rate is equally proportional to energy consumption. Therefore, the energy intensity of the textile industry is rapidly increasing in India. The Power Quality issue (Harmonics) is an undesirable phenomenon that came into existence due to the non-linear electronic components in the power system [1].

The textile industry is fast-growing and completely mechanized by sophisticated machinery to rapidly increase the industry's productivity with high accuracy. This intervention of highly sophisticated machinery has more scope for creating nonlinearities in the system. The Indian textile industries are classified into two which are organized (spinning and

The associate editor coordinating the review of this manuscript and approving it for publication was Javed Iqbal.

The Journal of Supercomputing
https://doi.org/10.1007/s11227-021-04243-z

An extended visual methods to perform data cluster assessment in distributed data systems

K. Subba Reddy[1] · K. Rajendra Prasad[1] · Govardhan Reddy Kamatam[2] · N. Ramanjaneya Reddy[3]

Accepted: 30 November 2021

Abstract

The cluster tendency is one of the major problems in data clustering. Deriving the number of clusters for an unlabeled dataset is known as the cluster tendency problem. In this paper, the preclustering problem for important clustering methods, such as *k*-means, hierarchical clustering, etc., is considered. Existing preclustering methods, i.e., the visual assessment tendency (VAT), effectively solve the cluster tendency (i.e., *k* in the *k*-means). Enhanced methods, such as the improved VAT (iVAT) and other related visual methods, have greatly succeeded in determining the precluster tendency for complex and large datasets. Clustering using the improved visual assessment tendency (ClusiVAT) is a recent visual method and is widely used for large datasets. However, it focuses primarily on the amount of data rather than the dimensionality. Big data in real-time applications possess large sizes and higher dimensions. The ClusiVAT uses the sampling technique to handle the amount of original data; however, it is not focused on high-dimensional big data. Thus, the proposed method develops scalable visual methods using linear subspace learning (LSL) techniques to overcome the curse of dimensionality. Empirical analysis is performed to demonstrate the efficiency of the proposed LSL-based visual methods using benchmarked datasets.

✉ K. Rajendra Prasad
krprgm@gmail.com

K. Subba Reddy
mrsubbareddy@yahoo.com

Govardhan Reddy Kamatam
govardhan.cse@gprec.ac.in

N. Ramanjaneya Reddy
nalavala.ramanji@gmail.com

[1] Department of CSE, Rajeev Gandhi Memorial College of Engineering and Technology, Nandyal, Andhra Pradesh, India

[2] Department of CSE, G. Pulla Reddy Engineering College, Kurnool, Andhra Pradesh, India

[3] Department of CSE, KSRM College of Engineering, Kadapa, Andhra Pradesh, India

Published online: 13 January 2022

Physical Communication 52 (2022) 101600

Contents lists available at ScienceDirect

Physical Communication

journal homepage: www.elsevier.com/locate/phycom

Full length article

Mobile sink-based data collection in event-driven wireless sensor networks using a modified ant colony optimization

Srinivasulu Boyineni [a,*], K. Kavitha [a], Meruva Sreenivasulu [b]

[a] Department of CSE, Annamalai University, Chidambaram, India
[b] Department of CSE, K.S.R.M College of Engineering, Kadapa, Andhra Pradesh, India

ARTICLE INFO

Article history:
Received 20 August 2021
Received in revised form 30 November 2021
Accepted 3 January 2022
Available online 13 January 2022

Keywords:
Wireless sensor networks
Data acquisition
Mobile sinks
Ant colony optimization
Machine learning

ABSTRACT

The hotspot problem is one of the primary challenges in the wireless sensor networks (WSNs) because it isolates the sink node from the remaining part of the WSN. A mobile sink (MS)-based data acquisition strategy mitigates the hotspot problem, but the traditional MS-based data gathering approaches do not resolve the issue. However, the conventional techniques follow a fixed order of visits and static traversal of the MS. In this context, this paper uses a modified version of the ant colony optimization strategy for the data collected through a MS to mitigate the hotspot problem in the WSNs while improving the energy efficiency, network lifetime, throughput by reducing the packet loss and delay. In our work, we initially construct a forwarded load spanning tree to estimate the freight of each node in the WSN. Further, we choose RPs and their path simultaneously using the modified ACO algorithm by considering the forward loads, remaining energy, distance, etc. The proposed work also adopts the virtual RP selection strategy void unnecessary data exchanges between the nodes and RPs. Hence, it reduces the burden on relay nodes and optimize the energy usage among the nodes. We compare our approach with the recent ACO-based algorithms, and our approach outperforms them.

1. Introduction

Wireless sensor networks (WSNs) are the most promising technologies because of the rapid growth of the Internet of things in several applications such as healthcare, forest fire, defense, home automation, etc. The primary reason behind this growth is because of several advantages of using WSNs, such as cost-effectiveness, tiny size, scalability, etc. In general, WSNs are composed of sensor nodes (SNs), where they are randomly scattered in the field of interest [1,2]. In each sensor node, a sensing module, transmitter, receiver, processing unit, buffer, and these are operated by using the battery power are equipped [3]. The batteries used in the SNs are limited in capacity, and it is a hectic task to replace and recharge them [4]. Hence, it consumes more energy due to the heavy data transmissions instead of other operations of the SNs. But, data transmission is necessary for the WSNs, because the central station called sink/base station (BS) performs further proceedings on these data [5]. These data transmissions mainly use a multi-hop communication mechanism, where some of the SNs are involved in relaying the data to the sink. Since these relay nodes involve more data exchanges and the early drain of their battery, it leads to energy-hole or hotspot problems. The hotspot problem is challenging in WSNs, where it isolates part of the networks and interrupts the data gathering process [6,7].

A mobile sink (MS) can alleviate the hotspot problem by visiting SN) in the WSN [8]. But, visiting every SN in a large area is not realistic and imposes several challenges such as delay, huge packet loss, congestion, etc. Instead of visiting each node, a set of visiting locations called Rendezvous points (RPs) are identified in WSN, where the MS reach only RPs and all other nodes send their data packets to the accessible RP [9,10]. But, determining RPs in the network and route all other nodes to words to other RPs is again challenging. However, several articles work on these challenges and provide an optimal solution [11–14]. However, all these works are focused on a network with uniform data generation. But, selecting the RPs and scheduling the MS for data acquisition in non-uniform data generated (Event-driven) WSNs is more challenging. The majority of the WSNs applications, such as forest fire, healthcare, defense, home automation, etc., are event-driven applications. The event-driven applications generates the data only when the event is occur in the network. However, they monitor the environment continuously [15]. But, the data is transmitted to sink node only when an even is occurred in the point of interest. Due to this cause, some of the SNs frequently generate the data whereas some of them generates few amount of packets. So, there is a requirement for data

* Corresponding author.
E-mail addresses: srinivasulu.inf@gmail.com (S. Boyineni), kavithacseau@gmail.com (K. Kavitha), mesrinu@rediffmail.com (M. Sreenivasulu).

https://doi.org/10.1016/j.phycom.2022.101600
1874-4907/

Annals of Operations Research
https://doi.org/10.1007/s10479-021-04235-5

SCIE 12

ORIGINAL RESEARCH

Small and medium-sized enterprises' contribution in digital technology

Girish Santosh Bagale[1] · Venkata Ramana Vandadi[2] · Deepmala Singh[3] · Dilip Kumar Sharma[4] · Durga Venkata Kusuma Garlapati[5] · Ravi Kumar Bommisetti[6] · Ravi Kumar Gupta[7] · Roy Setsiawan[8] · V. Subramaniyaswamy[9] · Sudhakar Sengan[10]

Accepted: 10 August 2021

Abstract

Researchers have mentioned the importance of digitization in improving efficiency and productivity in Small and Medium Enterprises (SME). Fortunately, there is no proof that Digitization can be used to deal with the outcome of severe incidents like COVID-19. The research paper suggested that the increased rate of SMEs has increased significantly. This was entirely due to the advent of Digital Technology (DT). In this way, both product and the process become more automated in digitalization, resulting in increased quality and demand. Considering the high scope for higher development, India's SME sector still has much space for new digital technologies to be integrated. This paper addresses the main scenario of SMEs in India and their benefit in GDP. Also, the research includes a brief analysis of CRM applications and digital payment options in SMEs.

Keywords SME · COVID-19 · Digitization · Customer relationship management

1 Introduction

A new Coronavirus Infection (COVID-19) erupted unexpectedly at the end of 2019 and began spreading to become such a global epidemic. COVID-19 had sickened, exceeding 129 million people worldwide by early March 2021 and more than about 12.2 million in India. This health concern has raised severe risks to the survival and growth of businesses, particularly Small and Medium-sized Enterprises (SMEs). In many ways, the COVID-19 epidemic has been economically damaging. Global supply chains have been made significantly vulnerable because government agencies restrict both importation and exportation to combat the infection. Second, delays in resuming work have drastically decreased firms' production capability, whereas fixed expenses like wage and rental had also remained consistent, result in severe financial problems. The falling prices due to the pandemic have put extreme stress on service providers such as food service, hospitality,

✉ Sudhakar Sengan
sudhasengan@gmail.com

Extended author information available on the last page of the article

Published online: 22 August 2021

Biomass Conversion and Biorefinery
https://doi.org/10.1007/s13399-021-01941-9

ORIGINAL ARTICLE

Effect of cashew shell biomass synthesized cardanol oil green compatibilizer on flexibility, barrier, thermal, and wettability of PLA/PBAT biocomposite films

T Thendral Thiyagu[1] · Sai Prasanna Kumar J.V[2] · Gurusamy P[3] · V Sathiyamoorthy[4] · Maridurai T[5] · Arun Prakash VR[6]

Received: 18 July 2021 / Revised: 30 August 2021 / Accepted: 8 September 2021

Abstract

The bio-based polymer blend of polylactic acid (PLA)-polybutylene adipate-co-terephthalate (PBAT) incorporated wit cashew shell biomass synthesized cardanol oil (CARD) was prepared by solution casting method. The various formulation were prepared with PLA/PBAT(90/10) polymer blend containing 1%, 3%, and 5 wt.% of cardanol oil. All the prepared PLA PBAT films were subjected to characterization techniques such as surface morphology, Fourier transform infrared spec troscopy, mechanical, thermal stability, X-ray diffraction, film color, opacity, wettability, and antimicrobial properties. Th FTIR and XRD results confirmed the effective miscibility and molecular interactions of cardanol oil in PLA/PBAT blend Further, the results of TGA analysis showed thermal stability improvement in PLA/PBAT bio-based film by the addition o cardanol oil. The homogeneous distribution of cardanol oil droplets on the PLA/PBAT blend was confirmed by observe SEM and TEM images. The mechanical result proved that the addition of 5 wt.% of cardanol oil into the PLA/PBAT blen increases the elongation at break. Moreover the bio-based PLA/PBAT film shows good barrier against water vapor and a poo barrier against oxygen permeability. The presence of cardanol oil in the PLA/PBAT matrix helps to enhance the optical an wettability properties of prepared bio-based film. Finally, it is proved from the investigational results that the PLA/PBAT cardanol biodegradable films may be recommended to use in food packaging applications wherever high flexibility, wate vapor barrier, thermal stability, antibacterial resistance, and less water absorption properties are required.

Keywords Biopolymer blend · PLA · PBAT · Cardanol oil · Compatibility

1 Introduction

The enormous usage of synthetic polymer in various field of packaging applications including food, healthcare/phar maceutical, FMCG, and automotive packaging industry ha resulted in an enhanced demand for eco-friendly bio-base polymers to decrease environmental problems caused b synthetic plastic materials [1]. The most commonly use biopolymers in the field of packaging application includ polylactic acid (PLA), polybutylene adipate-co-terephthalate (PBAT), chito droxybutyrate Among all, po able polymer radadability, hig has been cons mers in a var medical pack almost equiva

✉ T Thendral Thiyagu
thendralphd@rediffmail.com

1 Department of Printing and Packaging Technology, Anna University, Tamilnadu, India
2 Department of Aeronautical Engineering, Veltech Rangarajan Dr Sagunthala R&D Institute of Science and Technology, Chennai, India
3 Department of Mechanical Engineering, Chennai Institute of Technology, Chennai, India
4 Department of Mechanical Engineering, KSRM College of Engineering, Kadapa, Andhra Pradesh, India
5 Department of Mechanical Engineering, Saveetha School of Engineering, SIMATS, Chennai, India
6 Department of Mechanical Engineering, J.N.N Institute of Engineering, Chennai, India

Biomass Conversion and Biorefinery
https://doi.org/10.1007/s13399-022-02653-4

ORIGINAL ARTICLE

SUE 14

Novel *Spinifex littoreus* fibre and sugarcane biosilica on mechanical, wear, time dependent and water absorption behaviour of epoxy structural composite

J. Suresh Babu[1] · V. S. S.Murthy[1] · U. Pradeep Kumar[1] · V. Sathiyamoorthy[1] · A. Saravanakumar[1]

Received: 1 January 2022 / Revised: 12 March 2022 / Accepted: 31 March 2022

Abstract

A new *Spinifex littoreus* fibre-reinforced sugarcane bagasse biosilica particle dispersed epoxy resin hybrid comp made and described. The major goal of this study was to develop a novel epoxy hybrid composite system tha surface treated *Spinifex littoreus* fibre and sugarcane biosilica particle for sustainable material development. The treated with alkali and silane whereas the biosilica was treated with silane alone. The hand layup process was use the composites, which were then post-cured at 110 °C. The composites with base and silane-treated fibres have mechanical properties. The tensile and flexural strengths of the composite containing 1vol% powder were 148 and respectively. Similarly, with a Shore-D value of 94, the composite designation SPS_2 has the highest hardness. M vol% powder added composites explicated improved wear resistance. Composite fatigue behaviour has significantly with a fatigue life count of 26,822 for the composite designation SPS_2. The water absorption % of silane-treated particle in epoxy produced controlled water uptake. These improved composites might be used in structural, au aerospace, residential and military applications.

Keywords PMC · Fibre · Biosilica · Surface treatment · Mechanical · Fatigue

1 Introduction

Natural fibre-based polymer composites are becoming increasingly popular in the present technological world because of their less weight, structural stiffness and environmental friendliness. Polymer matrix composites (PMCs) are widely used in automotive and structural applications, beginning at domestic [1, 2]. New natural fibres from plants, fruits and leaves have been prepared and used in bio composites in recent years [1, 3]. Researchers have recently produced a number of natural particles from plants and agricultural wastes to enhance the characteristics of fibre-reinforced polymer composites. There are several examples of recent fibre extracts, including *Caryota urens*, lotus and mango kernel. However, *Spinifex littoreus* fibre research is few. Making composites with this fibre might be a remarkable endeavour due to the fact that it is a renewable, cally viable and environmentally safe resource. 7 it is sustainable and easy to process and has les losic content than the other commercially used nat This could be cultivated not only for making co and even to produce other domestic usable produ fully grown, it may reach 30 to 48 in. in lengt many interconnected branches. The fibre has a 0.78 g/cm^3 and includes 76.1, 10.2 and 2.4 wt% hemicellulose and holocellulose, respectively. Sim lignin concentration is 18.2 wt% and the ash conte wt% [4]. Milan et al. [5] studied the mechanical mal properties of a novel *Spinifex littoreus* fibre–polymer composites. The author has investigated n and thermal properties along with microstructure ing to the results, the highest mechanical prope obtained when 40vol.% of fibre is reinforced inte Addition of more fibre produced delamination research concluded. Similarly, Senthil et al. [6] r the mechanical, fracture toughness and fatigue be *Spinifex littoreus* fibre on echinoidea spike toughe composite. According to the author, this fibre is s

A. Saravanakumar
asaravana2021@yahoo.com

Department of Mechanical Engineering, KSRM College of Engineering, Kadappa, Andra Pradesh, India

References (41)

SCIE
15

Fuel
Volume 319, 1 July 2022, 123702

Impact of exhaust gas recirculation and split injection strategy combustion behavior on premixed charge compression ignition engine fuelled with moringa oleifera methyl ester

Selvakumar Ramalingam, D. Babu, A. Santhoshkumar, R. Deepakkumar, D. Ravikanth

Show more

Outline | Share | Cite

https://doi.org/10.1016/j.fuel.2022.123702

Highlights

- Moringa oleifera biodiesel was synthesized using sodium methoxide catalyst.
- Advanced injection timing and pressure improved the engine characteristics.
- Split injection drastically reduced the emissions compared to conventional injection.
- Split injection strategy and EGR technique have improved the engine characteristics.

Abstract

Influence of split injection strategy of moringa oleifera methyl ester and its blends with exhaust gas recirculation on diesel engine combustion, performance and emission characteristics using common rail direct injection (CRDI) system were investigated in this work. In split injection strategy, the pilot (PIT) and main injection timings (MIT) were fixed between 35 °CA – 40 °CA bTDC and 15 °CA –25 °CA bTDC, respectively. The minimum and maximum nozzle opening pressure were fixed as 300 and 600 bar with an interval of 100 bar.

Hindawi
Adsorption Science & Technology
Volume 2022, Article ID 8218476, 13 pages
https://doi.org/10.1155/2022/8218476

16

SAGE
Publishing

Research Article

Environmental Applications of Sorbents, High-Flux Membranes of Carbon-Based Nanomaterials

J. Suresh Babu ,[1] H. Bhavani Naga Prasanna ,[2] J. Satish Babu,[3] Yamarthi Narasimha Rao,[4] and Surafel Mustefa Beyan [5]

[1]*Department of Mechanical Engineering, KSRM College of Engineering, Kadapa, 516003 Andhra Pradesh, India*
[2]*Department of Basic Sciences & Humanities, Vignan's Nirula Institute of Technology & Science for Women, Guntur, India*
[3]*Department of Computer Science and Engineering, Koneru Lakshmaiah Education Foundation, Vaddeswaram, Guntur, India*
[4]*Department of CSE, QIS College of Engineering and Technology, Ongole, India*
[5]*School of Chemical Engineering, Jimma Institute of Technology, Jimma University, Jimma, Oromia, Ethiopia*

Correspondence should be addressed to H. Bhavani Naga Prasanna; bhavaninps@gmail.com and Surafel Mustefa Beyan; surafel.beyan@ju.edu.et

Received 1 November 2021; Revised 5 December 2021; Accepted 22 December 2021; Published 2 February 2022

Academic Editor: Lakshmipathy R

Carbon-based nanomaterials have unique and controllable properties, making it possible to find and treat environmental challenges. There are several environmental applications for carbon-based nanoparticles: sorbents, membranes, antimicrobial agents, and sensors. According to this review, carbon-based nanomaterials have a variety of environmental benefits. This article also looks at prospective uses of nanomaterials in environmental systems, utilizing carbonaceous nanoparticles as a guide for their physical, chemical, and electrical properties.

1. Introduction

A growing body of environmental research is focused on nanomaterials, which are being investigated as potential contaminants. Explaining how engineered nanomaterials affect the environment can help in the risk assessments and help in the development of safe new materials. However, focusing solely on the implications may obscure the wide range of nanotechnology applications being pursued in order to enhance environmental results in the long run. Carbon based nanomaterials' tunable physical, chemical, and electrical capabilities spur new approaches to tackling long-standing environmental problems.

Biomedical nanotechnology advancements have made it possible for environmental science and engineering to make similar gains. For example, synthetic transmembrane pores made of functionalized nanotubes and carbonaceous nanomaterials are employed to optimise drug fate and transport in thick tissues [1, 2]. Examples of analogous environmental applications include the targeted delivery of restorative agents, the specifically planned removal of dangerous substances, and new membrane structures for water filtering. As stated in this review, carbonaceous nanomaterials have both proactive (avoid environmental degradation, increase public health, and optimise energy efficiency) and retroactive (improve energy efficiency) environmental purposes. Wastewater reuse and pollutant transformation are all examples of remediation. Begin by learning more about carbonaceous nanomaterials and some of their unique properties. Further research will examine some of the most cutting-edge applications for carbon nanotechnologies in domains including sorbents and membrane separations with high flux rates.

Recent developments in the rational design and manipulation of nanomaterials have made a wide range of new technologies possible. Since carbonaceous nanoparticles have unique properties that allow for environmentally friendly uses, they can be created and deployed responsibly.

BULLETIN OF THE POLISH ACADEMY OF SCIENCES
TECHNICAL SCIENCES, Vol. 70(1), 2022, Article number: e139053
DOI: 10.24425/bpasts.2022.139053

Economic based evaluation of DGs in capacitor allocated optimal distribution network

G. SRINIVASAN[1]*, K. AMARESH[2], and Kumar Reddy CHEEPATI[2]

[1] Department of Electrical & Electronics Engineering, SASURIE College of Engineering, Vijayamangalam-638056, Tirupur, India
(Affiliated to Anna University, Chennai, India)
[2] Department of Electrical & Electronics Engineering, KSRM College of Engineering, Yerramasupalli, Kadappa – 516003, Andhra Pradesh, India

Abstract. Feeder reconfiguration (FR), capacitor placement and sizing (CPS) are the two renowned methods widely applied by the researchers for loss minimization with node voltage enrichment in the electrical distribution network (EDN), which has an immense impact on economic savings. In recent years, optimization of FR and CPS together can proficiently yield better power loss minimization and save costs compared to the individual optimization of FR and CPS. This work proposes an application of an improved salp swarm optimization technique based on weight factor (ISSOT-WF) to solve the cost-based objective function using CPS with and without FR for five different cases and three load levels, subject to satisfying operating constraints. In addition, to ascertain the impact of real power injection on additional power loss reduction, this work considers the integration of dispersed generation units at three optimal locations in capacitive compensated optimal EDN. The effectiveness of ISSOT-WF has been demonstrated on the standard PG&E-69 bus system and the outcomes of the 69-bus test case have been validated by comparing with other competing algorithms. Using FR and CPS at three optimal nodes and due to power loss reduction, cost-saving reached up to a maximum of 71%, and a maximum APLR of 26% was achieved after the installation of DGs at three optimal locations with the significant improvement in the bus voltage profile.

Key words: ISSOT-WF; capacitor placement and sizing; feeder reconfiguration; dispersed generation; electrical distribution network; additional power loss reduction

1. INTRODUCTION

The primary objective of the electrical distribution network (EDN) is to feed the required electrical energy to the end-user consistently, which depends on the quality and efficacy of the EDN. Due to the rapid growth in power demand, the power generation capacities need to be expanded to avoid blackouts which create severe financial problems in developing countries [1]. In India, the T&D losses are nearly 20% of the total power generation, which is almost three times compared to the United States. Therefore, to be more competitive, distribution companies (DISCOs) presently receive more attention in minimizing the I^2R loss as it reflects the cost of electricity. Feeder reconfiguration (FR), real and reactive power compensation are the most proficient techniques applied to EDN to suppress real and reactive power loss (P_{Loss} & Q_{Loss}) and bus voltage enrichment [2].

The importance of FR has been recognized from 1988 onwards. Hence, many types of research on optimal FR-based optimization problems are being focused [3–6]. By using FR, the merits such as a decrease in P_{Loss}, enrichment in bus voltage profile, load congestion management, and reliability of the EDN get improved and this will reflect in the performance improvement of the EDN. Although the EDN is set as a weak mesh network, its operation is radial for effective coordination with protection schemes and to reduce the fault level.

Since the 1960s, the application of shunt capacitors has been one type of imperative research in radial EDN. However, a part of a reduction in power loss could be done by capacitor placement and sizing (CPS), which feed a part of reactive power demand. It is well known that by the addition of capacitors in radial EDN, the benefits such as reduction in branch real & reactive power loss, increase in feeder capacity release, reduction in total KVA demand, reduced loading of thermally limited apparatus, bus voltage and power factor improvement can be obtained. Since capacitors lower the reactive power requirement from the main source (MS), more real-power output is available. In recent times, a lot of research has been focused on CPS problems [7–10] in EDN.

Combined optimization of FR and CPS will yield more reduction in P_{Loss}, Q_{Loss}, and enrichment in bus voltage profile compared to individual optimization of FR / CPS problems. Optimal CPS along the EDN with FR is a non-linear, complex, combinatorial, and mixed-integer optimization problem, which includes both integer and discrete variables that correspond to the optimal locations at which capacitors are required to be placed and the number of capacitor banks that are installed at each bus. It is also a computationally in-depth problem whose dimension increases extremely with network size. Only a few research papers are available in the literature for optimization of capacitor allocation and sizing together with FR [11–17].

*e-mail: prof.gsrinivasan@gmail.com

Manuscript submitted 2021-05-14, revised 2021-10-22, initially accepted for publication 2021-11-09, published in February 2022.

SCIE
18

Journal of Circuits, Systems, and Computers
Vol. 31, No. 10 (2022) 2250174 (17 pages)

DOI: 10.1142/S0218126622501742

World Scientific
www.worldscientific.com

A Two-Step Horizon Optimum Switching Vector-Model Predictive Control with a Novel Shunt Active Filter Reference Current Extraction*

Kumar Reddy Cheepati†
Electrical and Electronics Engineering,
Kandula Sreenivasa Reddy Memorial College of Engineering,
Kadapa, Andhra Pradesh 516003, India
kumareeephd@gmail.com

Marco Rivera
Department of Electrical Engineering
Universidad de Talca,
Merced 437, Curicó 3460000, Chile
marcoriv@utalca.cl

Patrick Wheeler
Power Electronics, Machines and Control Research Group
University of Nottingham, Nottingham, NG10 1NX,
United Kingdom
pat.wheeler@nottingham.ac.uk

Vivekanandan Subburaj
School of Electrical and Electronics Engineering,
Reva University, Bangalore, Karnataka 560024, India
vivekeee810@gmail.com

Suresh Krishnan‡ and Suresh Babu Daram§
Electrical and Electronics Engineering,
Sree Vidyanikethan Engineering College,
Tirupathi, Andhra Pradesh 517102, India
‡*sureshk340@gmail.com*
§*sureshbabu.d@vidyanikethan.edu*

Karnam Amaresh
Electrical and Electronics Engineering,
Kandula Sreenivasa Reddy Memorial College of Engineering,
Kadapa, Andhra Pradesh 516003, India
amaresh@ksrmce.ac.in

*This paper was recommended by Regional Editor Takuro Sato.
† Corresponding author.

ECS Transactions, 107 (1) 19607-19625 (2022)
10.1149/10701.19607ecst ©The Electrochemical Society

SCOPUS

19

Affine Transform Assisted Firefly Algorithm in Image Registry to MRI and CT Brain Images

[a]B. Suresh Babu, [b]r. M. Venkata Narayana
Email: sureshdecs10@gmail.com
[a]Department of ECE, JNTUA, Ananthapuramu, Andhra Pradesh, India.
[b]Department of ECE, KSRM College of Engineering, Kadapa, Andhra Pradesh, India.

Medical multimodality images create an essential need of Image registration. In this work, we focused on one of the components of the methods of which is the measure of similarity used to match the images. We are particularly interested in the iconic approach, which takes into account only the information carried by the intensities of the pixels of the images to be recalibrated. This approach has the advantage of being fully automatic, since no prior segmentation is necessary. The main contribution of this research work is to propose new measures of similarity based on cumulants and the development of edge worth and for some of them they approximate the Mutual Information, which is a measure of similarity of reference in registration. Tests on these new measures show their effectiveness for registration medical images. In addition, the generosity of the proposed approach allows the use of these measures in various situations. Further we proposed and analysed a novel multimodal image registration method for medical imaging using firefly algorithm (FF). We optimized the registration parameters of affine transform with firefly algorithm to register computed tomography (CT) brain image over magnetic resonance image (MRI) to maximize mutual information. We tested our method over images of different sizes and modality.

Keywords – Affine Transform, CT, FF and MRI.

INTRODUCTION

The image registration consists of spatially aligning two or more images, combining their information in a single visual representation [1]. For example, to align a set of magnetic resonance images with computed tomography images, the former allows exploring the soft tissues of the patient, while the latter highlight the rigid tissues, the mixture of both provides the adequate information for diagnostic procedures and surgical treatments. In this sense, the registration of images allows the simultaneous visualization of both types of images, aligned, scaled and merged.

As a comparison measure, mutual information (MI) is one of the most widely used in multimodal image registration processes, however, there are a lot of variations for different parts of the MI-based registration process. , such as, for example, the use of different types of optimization techniques, spatial transformation (interpolation) and improvements over the comparison measure by MI. Therefore, it is difficult to establish which methods have the best performance for the MI-based registry.

The main objective of this work is to systematically compare some methodologies for the registration of multimodal images using similarity measures based on MI.

Different methodologies were analysed for the registration of multimodal images based on MI, using different techniques for spatial transformation, optimization and considering improvements on the cost function (comparison measure), and the behaviour of each configuration was evaluated in situations of variability of medical images, that is, under noise conditions, gamma corrections and histogram equalizations. In such cases, it was obtained that MI-based image recording is capable of recording multimodal and unimodal images with little susceptibility to changes in brightness or contrast in the image, but with high sensitivity to noise. It was also established that the optimization techniques based on evolutionary algorithms have a better performance for the final result of registration in comparison with the other

Journal of Control, Automation and Electrical Systems
https://doi.org/10.1007/s40313-021-00753-6

Active Noise Control for PVC Duct Using Robust Feedback Neutralization F×LMS Approach

Turpati Suman[1] · Moram Venkatanarayana[2]

Received: 27 October 2020 / Revised: 26 April 2021 / Accepted: 9 June 2021

Abstract

The paper aims to design and analyse Active Noise Control (ANC) performance in PVC Duct experimentally for reducing periodic background noises. In the ANC system, different adaptive methods are preferred to reduce the unwanted noise, of which the most preferred one is the famous Filtered cross Least Mean Square (F×LMS) algorithm. On the other hand, since it is structured with acoustic feedback issues, the ANC's efficacy is degraded and becomes unstable. This problem could be overcome by implementing a Feedback Neutralization (FN) concept in the ANC system based on the F×LMS algorithm's step-size parameter to control the unwanted noise. The small step-size with the ANC system is robust compared to the large step-size because the large size is susceptible to any random noise change. In this article, a Harmonic Mean dependent Variable Step-Size (HMVSS) method is proposed and developed in the feedback neutralization F×LMS algorithm to continuously change the algorithm's step-size corresponding to the reference noise and error signals from the sensors. The proposed method improves the convergence rate of the ANC method toward the desired response. The simulation results demonstrated that the proposed AHMVSS method could achieve better noise reduction and convergence speed compared to F×LMS, FN F×LMS algorithms. Besides, ANC is implemented in the PVC Duct noise control application using the proposed F×LMS feedback neutralization algorithm to produce a real-time anti-noise signal experimentally to limit PVC Duct noise. The experimental findings show that reducing noise in PVC Duct holds good, approximately 23–29 dB for different noises.

Keywords Active noise control · F×LMS · Acoustic feedback · Feedback neutralization · PVC duct · DSKC6713 kit

Abbreviations

ANC	Active noise control
PNC	Passive noise control
LMS	Least mean square
F×LMS	Filtered cross least mean square
AF	Acoustic feedback
FN	Feedback neutralization
HMVSS	Harmonic mean variable step size
DSP	Digital signal processor
DSK	Digital signal processor kit
CCS	Code composer studio
MSE	Mean square error
NR	Noise reduction
NRR	Noise reduction ratio
PP	Primary path
SP	Secondary path
PVC	Polyvinyl chloride
μ	Step-size
M	Filter order

✉ Turpati Suman
turpatisuman87@gmail.com

Moram Venkatanarayana
narayanamoram@gmail.com

[1] Department of ECE, JNT University, Ananthapuramu 515002, AP, India

[2] ECE Department, KSRM College of Engineering (Autonomous), YSR, Kadapa 516003, AP, India

1 Introduction

In the present scenario, most people want to live with comfort and composure, but with modern technology development, the atmosphere is filled with acoustic pressures (sound). As a result, human life has been disrupted, and it faces many health problems. Many sound sources related to noise are produced from industries (fans, blowers, exhaust pipes, engines), household machines, automotive, public spaces, etc.

The ANC system is used to attenuate the background noise emitted from different noise fields. It functions

Published online: 02 July 2021

Weather Prediction using Advanced Machine Learning Techniques

G. Hemalatha[1], K. Srinivasa Rao[2], D. Arun Kumar[3]

[3] Machine Learning group of Center for Research and Innovation
[1,3] Department of ECE
[2] Department of CSE
[1,2,3] KSRM College of Engineering, Kadapa, Andhra Pradesh.
[1] latha.g@ksrmce.ac.in, [2] ksr@ksrmce.ac.in,[3]dasariak@ksrmce.ac.in

Abstract. Prediction of weather condition is important to take efficient decisions. In general, the relationship between the input weather parameters and the output weather condition is non linear and predicting the weather conditions in non linear relationship posses challenging task. The traditional methods of weather prediction sometimes deviate in predicting the weather conditions due to non linear relationship between the input features and output condition. Motivated with this factor, we propose a neural networks based model for weather prediction. The superiority of the proposed model is tested with the weather data collected from Indian metrological Department (IMD). The performance of model is tested with various metrics..
Index Terms—Indian Metrological dataset, Weather Prediction, Neural networks, Pattern Classification.

1. Introduction

Prediction of weather on daily basis plays an important role in taking the efficient decisions [1]. The dynamics in the conditions of weather motivates the researchers to propose efficient models for data prediction [2]. There exist various type of linear weather prediction models [3]. The problem with linear models is that they do not consider the non-linearity in the input data [4]. In the recent years, non linear models were suggested for weather prediction [5].

The basic weather prediction models are classified as data classification, data clustering and data prediction [6]. Weather data classification is termed as predicting the condition of the weather based on the input parameters [7]. The output of prediction model is a class which demonstrates the condition of the weather [8]. In the weather data clustering, the input data is clustered in to groups with each cluster having a cluster centroid. The number of cluster centroids are equal to the number of clusters in the data [9], [13]. Weather data clustering is also called as Unsupervised learning [5], [11], [12]. Weather data prediction is also called as regression analysis in which the value of output variable is predicted using various type of linear and non-linear predication models [10], [15].

The present study is a weather prediction model related to the weather data classification. In general weather data classification models do not consider the non-linear relationship between the input parameters and the output conditions [13], [14]. Motivated with this factor, a Fully connected neural network (FCNN) model is suggested for weather data classification. The FCNN model considers the non linear nature between the input features and the output class label during the classification stage.

ECS Transactions, 107 (1) 19459-19468 (2022)
10.1149/10701.19459ecst ©The Electrochemical Society

Scopus

22

Sub-Threshold Voltage Operated High Speed Domino Logic OR and AND Gates

Komal Shrivastava[a], Parul Garg[b], Syed Zahiruddin[b], Avireni Srinivasulu[d] and Cristian Ravariu[e]

[a]Department of Electronics and Communication Engineering, JECRC University, Jaipur, India

[b]Department of Electronics and Communication Engineering, KSRMCollege of Engineering, Kadapa, A.P, India.

[c]School of Engineering and Technology, K.R. Mangalam University, Sohna Rural, Gurugram 122103, Haryana State, India.

[d]Department of Electronic Devices Circuits and Architectures, Politehnica University of Bucharest, Romania

This paper demonstrate a new design technique for the implementation of sub-threshold voltage range domino logic gates using MOSFETs. The paper shows the implementation of the sub-threshold voltage domino logic for OR, and AND gates. These circuits work in the sub-threshold voltage range, hence, drastically reducing power consumption. This is achieved by adding a voltage boosting block that is introduced with the value of a capacitor of 1 pF which creates a faster and power-efficient pull-down network. These proposed circuits are operated at sub-threshold voltages. These circuits are simulated with +0.3 V supply voltage to yield results with good driving capability and good noise margins. The proposed circuits are designed using gpdk 180 nm CMOS designprocess using an LTspice tool.

Introduction

As the transistor gets reduced to smaller and smaller in size the leakage current problem increases. There are '*n*'number of factors contributing to this problem. It is only to a certain extent that the supply voltage to a circuit can be reduced; further reduction if any would result into unexpected outputs. Consequently a major challenge that researchers and circuit designers face is keeping the power consumption reasonable while increasing the number of devices, since scaling voltage exponentially increases leakage current (**Sandeep, G, et al., 2019, Liu, Z, et al., 2006, Erbagci, B, al., 2016, Sherif A. et al., 2009**). One way of reducing the power consumption is to operate devices in the sub-threshold region making use of the leakage current (**Lakshmi, P. V. et al., 2018, Sarada, M. et al., 2018, Srinivasulu, A. et al., 2018, Sarada, M. et al., 2017, Saini, J. K. et al., 2017**). These circuits have eminently low power consumption as compared to their strong inversion counter parts. Medium to high performance can be achieved by these circuits. Sub-threshold logic circuits have extensive applications for devices with ultralow power such as wrist watches, defibrillators, pacemakers etc (**Kavitha, P. et al., 2016, Sarada, M, et al., 2016, Sarada, M, et al., 2016, Nagateja, T, et al., 2015**). Despite the advantage of greatly reduced power these circuit families remain considerably unexplored as such. This paper attempts to propose a robust sub-threshold circuit with increased performance using Domino logic.

Domino logic is a preferred choice for high performance applications due to its high speed and lesser area in comparison to static CMOS. The power requirement is much higher due to its constant switching and clock load. Also, domino logic does not show good immunity to noise. Solutions to these problems are provided by using keepers and footers. Keeper sizes are varied to reduce circuit delay simultaneously compensating for the leakage current. Footers are

A multi-objective opposition-based barnacles mating optimization for image super resolution using hyper-Spectral images

Valli Bhasha A. and Venkatramana Reddy B.D.
JNTUA, Ananthapuramu, India

Received 19 January 2021
Revised 1 March 2021
Accepted 12 April 2021

Abstract

Purpose – The problems of Super resolution are broadly discussed in diverse fields. Rather than the progression toward the super resolution models for real-time images, operating hyperspectral images still remains a challenging problem.

Design/methodology/approach – This paper aims to develop the enhanced image super-resolution model using "optimized Non-negative Structured Sparse Representation (NSSR), Adaptive Discrete Wavelet Transform (ADWT), and Optimized Deep Convolutional Neural Network". Once after converting the HR images into LR images, the NSSR images are generated by the optimized NSSR. Then the ADWT is used for generating the subbands of both NSSR and HRSB images. The residual image with this information is obtained by the optimized Deep CNN. All the improvements on the algorithms are done by the Opposition-based Barnacles Mating Optimization (O-BMO), with the objective of attaining the multi-objective function concerning the "Peak Signal-to-Noise Ratio (PSNR), and Structural similarity (SSIM) index". Extensive analysis on benchmark hyperspectral image datasets shows that the proposed model achieves superior performance over typical other existing super-resolution models.

Findings – From the analysis, the overall analysis of the suggested and the conventional super resolution models relies that the PSNR of the improved O-BMO-(NSSR+DWT+CNN) was 38.8% better than bicubic, 11% better than NSSR, 16.7% better than DWT+CNN, 1.3% better than NSSR+DWT+CNN, and 0.5% better than NSSR+FF-SHO-(DWT+CNN). Hence, it has been confirmed that the developed O-BMO-(NSSR+DWT+CNN) is performing well in converting LR images to HR images.

Originality/value – This paper adopts a latest optimization algorithm called O-BMO with optimized Non-negative Structured Sparse Representation (NSSR), Adaptive Discrete Wavelet Transform (ADWT) and Optimized Deep Convolutional Neural Network for developing the enhanced image super-resolution model. This is the first work that uses O-BMO-based Deep CNN for image super-resolution model enhancement.

Keywords Adaptive discrete wavelet transform, deep convolutional neural networks, hyperspectral images, opposition-based barnacles mating optimization, optimized, peak signal-to-Noise-Ratio, structural similarity index, image super resolution, Non-Negative structured sparse representation

Paper type Research paper

Nomenclature

Abbreviations	Descriptions
CNNs	= convolutional neural networks;
SISR	= single image super resolution;
HR	= high resolution;
NSSR	= non-negative structured sparse representation;
RMSE	= root mean square error;
O-BMO	= opposition-based barnacles mating optimization;

Journal of Engineering, Design and Technology

1726-0531
DOI 10.1108/JEDT-01-2021-0039

Scopus

24

International Journal of Image and Graphics
(2022) 2250046 (31 pages)

DOI: 10.1142/S0219467822500462

World Scientific
www.worldscientific.com

Automated Image Super Resolution with the Aid of Activation Function Optimized Deep CNN and Adaptive Wavelet Lifting Approach

A. Valli Bhasha*
ECE Department
JNTUA, Ananthapuramu, Andhra Pradesh, India
vbksrmce@gmail.com
valli@ksrmce.ac.in

B. D. Venkatramana Reddy
ECE Department
Sir Vishveshwaraiah Institute of Science & Technology
Madanapalle, Andhra Pradesh, India
Balam.diguva@gmail.com

Received 14 September 2020
Accepted 10 August 2021
Published 3 November 2021

Diverse image super-resolution (SR) techniques have been implemented to reconstruct the high-resolution (HR) images from input images through lower spatial resolutions. However, the evaluation of the perceptual quality of SR images remains an important and complex research problem. This paper proposes a new image SR model with the intention of attaining maximum Peak Signal-to-Noise Ratio (PSNR). The conversion of low-resolution (LR) images from the HR images is performed by bicubic interpolation-based downsampling and upsampling. Then, the four sub-bands of LR and HR images are generated by the novel Adaptive Wavelet Lifting approach, in which the filter modes are optimized using the proposed SA-CBO. From this technique, LR wavelet sub-bands (LRSB) for LR images and HR wavelet sub-bands (HRSB) for HR images are formed. With the help of the LRSB and HRSB images, the residual images are formed by the adoption of the optimized Activation function and optimized hidden neurons in a deep convolutional neural network (CNN). The improvement in both the adaptive wavelet lifting approach and deep CNN is made by the self-adaptive-colliding bodies optimization (SA-CBO). Finally, the inverse adaptive wavelet lifting approach is used to produce the final SR image. Experimental results on publicly available SR image quality databases confirm the effectiveness and generalization ability of the proposed method compared with the traditional image quality assessment algorithms.

Keywords: Super-resolution; high-resolution images; peak signal-to-noise ratio component; LR wavelet sub-bands; HR wavelet sub-bands; deep convolutional neural network; self-adaptive-colliding bodies optimization; adaptive wavelet lifting approach.

*Corresponding author.

Scopus

25

Sensing and Imaging (2022) 23:19
https://doi.org/10.1007/s11220-022-00388-0

ORIGINAL PAPER

Adaptive Higher-Order Spectral Analysis for Image Recovery Under Distortion of Moving Water Surface using Dragonfly-Colliding Bodies Optimization

Kattela Pavan Kumar[1] · Matcha Venu Gopala Rao[2] · Moram Venkatanarayana[2]

Received: 2 November 2021 / Revised: 18 February 2022 / Accepted: 17 April 2022

Abstract

Reconstruction of an underwater object from a sequence of images distorted by moving water waves is a challenging task. Most of the environmental research has been employing image data in recent days. The precision of this research is often dependent on the superiority of image data. In the existing approaches, the problem of analyzing video sequences when the water surface is disturbed by waves. The water waves will affect the appearance of the individual video frames such that no single frame is completely free of geometric distortion. Thus, the image acquisition from the environmental condition is more complex and crucial, but it must be focused on getting the high spectral and spatial quality. The primary intent of this paper is to plan for the intelligent higher-order spectral analysis for recovering the images from the moving water surface. The three main phases of the proposed image recovery model are (a) image pre-processing, (b) lucky region selection, and (c) image recovery. Once the pre-processing of the image is carried out, the lucky region selection is performed by computing the dice coefficient method. As a modification to the existing methods, the proposed model adopts optimized bispectra to enhance the quality of the recovered image. A hybrid algorithm with Dragonfly-Colliding Body Optimization (D-CBO) is used for enhancing the bispectra method. The proposed model has been tested on distorted underwater images. From the experimental analysis, in terms of PSNR measure, the suggested D-CBO-bispectra gets better efficiency than other conventional models, in which D-CBO-bispectra is 10.7%, 8.7%, 19%, 6.8% and 5% progressed than Blind deconv, Bispectra, Bispectra with Fourier, and Radon transform, respectively. Finally, the comparison of the proposed model with the existing approaches proves the method's efficiency.

Keywords Higher-order spectral analysis · Distortion of moving water aurface · Lucky region selection · Image recovery by optimized bispectra · Dragon-colliding body optimization

Extended author information available on the last page of the article

Materials Today: Proceedings xxx (xxxx) xxx

Contents lists available at ScienceDirect

Materials Today: Proceedings

journal homepage: www.elsevier.com/locate/matpr

An experimental analysis on withstand ability of cellulosic insulating material immersed in NEO for transformer

T. Mariprasath *, M. Murali, S.M. Khaja Moinuddin, S. Khaleefa

Department of EEE, K.S.R.M College of Engineering (Autonomous), Kadapa, AP, India

ARTICLE INFO

Article history:
Available online xxxx

Keywords:
Transformer
Mineral oil
Bio degradation
Vegetable oil
Kraft paper
Press board

ABSTRACT

Worldwide, renewable insulating materials are playing a vital role in the design of transformers. Because conventionally, used insulating material is derived from non-renewable fossil fuels. Furthermore, the availability of fossil-based insulating materials is going to run out very shortly due to vast consumption. Also, fossil fuel-based insulating materials harm the environment. Therefore, renewable-based insulating materials need an hour. Hence, the research work proposes renewable-based as well as environmental free insulating material for transformers. First, a critical evaluation of current developments in alternate liquid dielectrics for transformers has been conducted. Consequently, critical characteristics of insulating oil have been measured according to the standard. Added to that, the critical characteristics of Natural Ester Oil (NEO) are estimated at a diverse temperature from 50 °C to 150 °C. The experimental analysis found that the critical characteristics of NEO oil are comparable that MO. Furthermore, the thermal withstand ability of solid insulating material immersed in NEO oil is higher than that of MO.

Selection and peer-review under responsibility of the scientific committee of the International Conference on Smart and Sustainable Developments in Materials, Manufacturing and Energy Engineering

1. Introduction

Now a days, the power demand is increasing excessively because of its high usage of electronics appliances [1]. The transformer is a very significant apparatus in power systems. A few minutes of failure is affecting end users. Therefore, stable as well as reliable operation of a transformer is essential. Transformer failure depends on insulation degradation; transformers are composed of solid and liquid insulating materials. Wherever, the cellulosic insulating material is impregnated with the MO, which enhances the insulation integrity as well as the life cycle of the insulation medium. The solid insulating material is made upon the cellulosic insulating materials [2]. The kraft paper is used to provide insulation between the turn of transformer windings. While the pressboard has been offered insulation between phase windings, the connection leads out. In other words, the high voltage stress area is insulated by the hard pressboard since with stand ability of this pressboard is significantly higher than that of kraft paper [3].

Mineral Oils are not suited for use in construction areas due to their poor flammability. Chlorinated hydrocarbon liquid has been available since 1932 [4]. Because these hydrocarbon fluids include harmful components, they are now banned globally. Air, nitrogen, and glass insulators are employed as insulating media in some transformers. This insulator is designed to be used with outdoor transformers. By adding a small amount of hydrocarbon, the gas's BDV is improved. To alleviate the heat, air was circulated naturally in the early days. Nowadays, we use fan-cooled external radiators with convection or pumping to circulate the oil [5].

By liquid dielectrics, the operating temperature of the distribution transformer is kept below acceptable ranges. Mineral oil is commonly used for distribution transformer insulation because of its excellent physical, chemical, and electrical qualities. Mineral oil, on the other hand, is derived from a modest range of petroleum extraction processes. Mineral oils such as paraffinic, naphthenic, and mixed mixtures are commonly employed. Fossil fuels are used to make them. However, due to the faster rate of depletion of fossil fuels, today's oil crises are becoming more common. It also has a lower fire point, making it prohibited in fire industries and environmentally sensitive areas. Using liquid dielectrics, the operating temperature of the distribution transformer is kept below acceptable ranges [6]. Mineral oil is commonly used for distribution

* Corresponding author.
E-mail address: ts.mariprasath@gmail.com (T. Mariprasath).

https://doi.org/10.1016/j.matpr.2021.11.339
2214-7853/
Selection and peer-review under responsibility of the scientific committee of the International Conference on Smart and Sustainable Developments in Materials, Manufacturing and Energy Engineering

Materials Today: Proceedings xxx (xxxx) xxx

Contents lists available at ScienceDirect

Materials Today: Proceedings

journal homepage: www.elsevier.com/locate/matpr

Simulative design and performance analysis of hybrid optimization technique for PEM fuel cell stack based EV application

C.H. Hussaian Basha [a], T. Mariprasath [a,*], M. Murali [a], Shaik Rafikiran [b]

[a] Centre for Research & Innovation, KSRM College of Engineering (Autonomous), Kadapa, AP 516003, India
[b] Sri Venkateshwara Engineering College (Autonomous), Tirupati, AP 517502, India

ARTICLE INFO

Article history:
Available online xxxx

Keywords:
Duty cycle
Fast tracking speed
High voltage conversion ratio
Interleaved circuit
Less distortions in converter output voltage
And universal input voltage

ABSTRACT

The fuel cell power generation systems are using in most of the present hybrid Electric Vehicle (EV) technology. The output characteristics of fuel cell arenonlinear. Also, the fuel operating point fluctuate continuously based on its operating temperature condition. In order to track and stabilize the operating point fuel cell, an Artificial Neuro Fuzzy Inference System-Genetic Algorithm Optimization (ANFIS-GAO) method is used. The merits of this proposed Maximum Power Point Tracking Technique (MPPT) are high extraction power capacity, high reliability, less oscillations, and fast tracking speed. The fuel cell is having a drawback of high output current and its less output voltage generation capability. To overcome this issue, in this work, an interleaved dc-dc converter circuit is used to enhance the fuel cell energy. The advantages of the proposed dc-dc converter are low voltage stress across the switches, less input current ripples, faster response, reduced electromagnetic emission, and high reliability. The proposed hybrid power point tracking technique performance is evaluated against with the Variable Step-Perturb & Observe (VS-P&O) algorithm. The MATLAB/Simulink environment is used for the performance analysis of proposed system.

Selection and peer-review under responsibility of the scientific committee of the International Conference on Smart and Sustainable Developments in Materials, Manufacturing and Energy Engineering

1. Introduction

From the last few years back, the usage of nonrenewable energy sources are reducing drastically because of their drawbacks are limited availability in the nature and high operating cost. The classification of nonrenewable or conventional sources are oil, natural gasses, coal, and nuclear. The oil power generation is used in most of the commercial applicationsbecause of its merits are high energy density, easily available in all over the places, constant power supply, and huge industrial applications. The disadvantages of the oil power stations are high water pollution, and releases greenhouse gasses [1]. From the literature study, the natural gas power supply is used in most of the industrial applications. The merits of this type of power station are high reliable, abundant, easy transportation, and less pollution when compared to the oil [2]. The coal power is a highly affordable power source because it's available with constant price. Also, it can burn easily and produces high energy based on the consumption of coal [3]. The drawbacks of this coal power plant are highly expensive, and negative impact on atmosphere.

The drawbacks of conventional energy sources are limited by using the non-conventional energy sources which are wind energy, geothermal energy, hydro energy, tidal energy, solar energy, and fuel [4]. In wind power generation, the wind energy is converted to rotating energy by utilizing the blades. The rotating blades are connected to ground mount generator to convert rotating energy in to useful electrical energy. The output of wind energy is increased with the cube of the available speed [5]. So, most of the wind power stations are installed near to the hilly areas. The major advantage of wind power system is to reduce the dependency on other power generation sources. Also, it cannot releases greenhouse gas emissions. The demerits of this type of power generation are inconsistent, high visual impact, and noise disturbances. The hydropower is obtained from the water in motion. This type of plants capture the energy from the falling water in order to produce the electricity. The working principle of hydropower station is conversion of mechanical energy in to electrical

* Corresponding author.
E-mail address: ts.mariprasath@gmail.com (T. Mariprasath).

https://doi.org/10.1016/j.matpr.2021.08.286

Selection and peer-review under responsibility of the scientific committee of the International Conference on Smart and Sustainable Developments in Materials, Manufacturing and Energy Engineering

Materials Today: Proceedings xxx (xxxx) xxx

Contents lists available at ScienceDirect

Materials Today: Proceedings

journal homepage: www.elsevier.com/locate/matpr

Thermal degrade analysis of solid insulating materials immersed in natural ester oil and mineral oil by DGA

Shaik Rafi Kiran [a], T. Mariprasath [b,*], CH Hussaian Basha [b], M. Murali [b], M. Bhaskara Reddy [b]

[a] Sri Venkateshwara Engineering College (Autonomous), Tirupati, Andhrapardesh 517502, India
[b] K.S.RM College of Engineering (Autonomous), Kadapa, Andhrapardesh 516005, India

ARTICLE INFO

Article history:
Available online xxxx

Keywords:
Transformer
Mineral oil
Bio degradation
Vegetable oil
Kraft paper
Press board

ABSTRACT

Globally, natural ester based insulating oils are playing a significant role for insulation design of the transformer. Because of, ester based insulating oil's critical properties are meeting the standard requirement as liquid dielectrics for transformer. For past century, mineral oil is used as an insulating liquid as well as heat transfer agent for transformer. However, it has less biodegradable characteristics, so which causes negative environmental effects on atmosphere. In addition, availability of fossil fuel is very low. Therefore, the manuscript proposes natural ester oil is alternate liquid dielectrics for transformer. However, critical properties of vegetable oil based liquid dielectrics are depends on the fatty acids. Therefore, two types of oil samples are used such as high saturated fatty acid ester oil (SFEO) and unsaturated fatty acid ester (UFEO), respectively. Initially, oil samples critical properties are measured according to the standard. Subsequently, accelerated thermal aging study has been carried out on all the oil samples for evaluating thermal stability of oil samples. Then, combustible gas estimation of oil samples has been carried out by Dissolved Gas Analyzer. Results are shows that, critical properties of SFEO is comparable that of others. In addition, degradation rate of insulating material is low when it immersed in SFEO that of other oil samples. Finally, SFEO is emitting low combustive gas that of mineral oil with catalyst.

1. Introduction

Transformer insulating medium composed of solid insulating material immersed with liquid dielectrics. The solid insulating materials are providing the insulation between the adjacent turns and phase winding. The solid insulating materials are kraft paper and press board [1]. Moreover, pressboard offers high resistance to break under electrical thermal and chemical stress. Therefore it can be used in high potential stress areas in the transformer such as between phase winding and connection lead outs. While, liquid insulating materials such as mineral oil based liquid dielectrics are obtained from distillation process of petroleum form fossil fuels [2]. The primary role of mineral oil is heat transfer. Whenever, transformer under thermal stress results pressure inside the transformer in increases. Therefore, a force is developed due to this force oil is circulating the transformer cooling tubes. The cooling tubes of transformers are elevated to the atmosphere. Therefore, by convection principle the heat energy is transferred to atmosphere and oil gets cooled. In addition, liquid dielectrics are offers better insulation between the transformer windings [3].

The premature failure of transformer is due to insulation degradation. Several studies found that 30% of transformer failures depends on the deterioration of solid insulating materials whereas 70% of failure is depends on the degradation of insulating oil [4]. Since, during transformer operation, there is electro mechanical stress is occurred in the transformer which leads to the insulation breakdown of transformer. Therefore, the insulating material should and must have capability of withstood under above mention stress [5]. To suppress the limitation of mineral oil ester oil are developed. Initially, synthetic ester oil are discovered which are has high withstand ability under electrical stress. The synthetic ester is developed from organics acids, these are synthesis form alcohol. The significance of synthetic ester is able to absorb high moisture content, low flammable and so it does not reacts with the oxygen [6]. This means that it posse's higher oxidation stability. But, the viscosities of the synthetic ester oil are higher than that of mineral oil. It causes low fluid flow and cost is high. In addi-

* Corresponding author.
E-mail address: ts.mariprasath@gmail.com (T. Mariprasath).

https://doi.org/10.1016/j.matpr.2021.09.015
2214-7853/

Materials Today: Proceedings xxx (xxxx) xxx

Contents lists available at ScienceDirect

Materials Today: Proceedings

journal homepage: www.elsevier.com/locate/matpr

An improved differential evolution optimization controller for enhancing the performance of PEM fuel cell powered electric vehicle system

CH Hussaian Basha [a,*], M. Murali [b], Shaik Rafikiran [c], T. Mariprasath [a], M. Bhaskara Reddy [a]

[a] Centre for Research & Innovation, KSRM College of Engineering (Autonomous), Kadapa, AP 516003, India
[b] Department of EEE, KSRM College of Engineering (Autonomous), Kadapa, AP 516003, India
[c] Department of EEE, Sri Venkateshwara Engineering College (Autonomous), Tirupati, AP 517502, India

ARTICLE INFO

Article history:
Available online xxxx

Keywords:
Boost converter
Differential evolutionary
Fuel cell
Fuzzy logic
High voltage gain
Less potential stress

ABSTRACT

At present, the fuel cell is playing major role in the current automotive industry application. Also, the fuel cell have the features of good reliability, high flexibility, reduced demand for foreign oil, and enhanced environment quality. However, for each and every functioning temperature variation, the Fuel Cell (FC) gives different working peak power points on it nonlinear voltage versus current curves. In this article, an Improved Differential Evolutionary Optimization (DEO) method is included in the Fuzzy Logic Controller (FLC) to enhance the maximum power delivered by the fuel cell stack. Here, the main objective of the DEO technique is to optimize the membership functions of the fuel cell stack input and output variables. Due to the proper selection of membership functions, the proposed MPPT controller gives fast tracing speed, good accuracy, and high sustainability. Also, a high voltage gain, nonisolated dc-dc converter is proposed in this work to enhance the fuel cell output voltage and reduce the current flowing through the consumer loads. The properties of converter are less potential pressure across the switches, extensive output voltage functioning, low supply current ripples, and high supply voltage withstand capability.

Selection and peer-review under responsibility of the scientific committee of the International Conference on Smart and Sustainable Developments in Materials, Manufacturing and Energy Engineering

1. Introduction

Now a days, the availability of fossil fuels are reduced drastically. As a result, the world government organizations are focusing on green energy technologies. The environmental Renewable Energy Sources (RES) are proved that the utilization of efficiency of electrical vehicle technology is very high when associated with the other availed energy sources. From the literature survey, the RES are very popular and it doesn't affect the environmental conditions. Also, the cost of availability of natural sources have been lead to exhaustive widespread globally [1]. However, the stochastic performance of natural sources and are interconnected with the other electrical distribution systems has risen to electrical energy consistency problems. So, the interconnection of electrical energy storage systems with the natural energy systems may give the solution for the techno economic issues and it helpful for the long life operation. The suitable selection of cost, control, and size of electrical storage systems is a very complex problem for the installation of renewable systems [2].

Among the different availed energy storage devices, battery based storage is employed in RES because of its wide rating of power supply system's. Conversely, the less working life time and excessive replacement cost are the major concerns in battery operated vehicles. This issues are altered by the conversion of natural energy sources in to hydrogen and water. The conversion of energy has been done by utilizing the effective electrolyzers. The collected hydrogen is stored in different forms and it is given to the fuel cell input [3]. The fuel stack is an equipment and it generate the electrical supply by the use of chemical reaction of the hydrogen and oxygen. The merits of present fuel cell technique when equated with the battery are noise less, high operating efficiency, good reliability, and excluding atmospheric pollution [4].

Year wise, the fuel cell market demand is given in Fig. 1. In the market, there are many fuel cell devices are available such as molten carbonate FC, alkaline fuel cell device, solid oxide type fuel device, phosphoric acid fuel device and finally, Proton Exchange type Membrane Fuel Cell (PEMFC). Among all of the fuel cell devices, the PEMFC technology is applied to the electric vehicle

* Corresponding author.
E-mail address: sbasha238@gmail.com (CH Hussaian Basha).

https://doi.org/10.1016/j.matpr.2021.09.011
2214-7853/
Selection and peer-review under responsibility of the scientific committee of the International Conference on Smart and Sustainable Developments in Materials, Manufacturing and Energy Engineering

Article

Impact of COVID-19 pandemic and the diagnosis of the virus in the human body

August 2021 · World Journal of Engineering ahead-of-print(ahead-of-print) · Follow journal
DOI: 10.1108/WJE-03-2021-0157

Bingi Manorama Devi · Sandeep Vemuri · A. Chandrashekhar · Show all 6 authors · Pankaj Kundu

Abstract

Purpose The COVID-19 pandemic has led to a huge loss of human life worldwide and presents an unprecedented challenge to public health, food systems and the world of work. Tens of millions of people are at risk of falling into extreme poverty due to loss of their carriers. Mainly, the people who work in public places are impacted due to this decease. The frontline warriors such as doctors, health workers, sweepers and policemen showed their effort to reduce the spreading of the virus. In this paper gives the detailed view of how the corona virus evaluated and how it spread from one person to another person and how we prevent this virus. The purpose of the paper, detailed about the diagnosis of the virus in the human body. There are some tests associated to know the presence of virus in our body; these are nose test, chest scan and CT scan of lungs.
Design/methodology/approach Molecular analysis methods such as antibody or enzyme tests are used to assess whether the infection is present. The most common lancing techniques include using a cotton swab is in the back of the neck. Then hands over the sample to the doctor for examination. Polymerase chain reaction (PCR) is performed on the sample. This test screens for viral DNA. A CO19 PCR test can detect unique SARS-2 gene products. If one of these genes is ignored, it will return as an invalid result This test is useful only for patients who are already suffering from COVID-19. You cannot know if anyone has the infection, and they cannot say for sure whether they ever did. Serological tests are particularly useful for detecting cases of infection with mild or no symptom.
Findings In this paper, the different tests provided to diagnosis the virus and the prevention measures to be taken to prevent the virus from spreading from one person to another are explained.

Journal of Nuclear Energy Science & Power Generation Technology

Research Article

A SCITECHNOL JOURNAL

Facial Recognition Based Upon the Domestic Security System Using IOT

V Lokeswara Reddy[1*], G Naga Rama Devi[2], A Prakash[3], T Coumaressin[4], Sheik Faritha Begum[5] and D Vijendra Babu[6]

Abstract

The Internet of Things is developing, which will be significantly evolving in all fields such as industry, medical, enterprises, domestic appliances, intelligent gadgets, etc. In a little more Information applications, its mixed development in the areas of image processing has begun to spread. The successful complexity of IoT devices and intelligent sensors helps to restructure a human personality for better outcomes and safety. Designers identify the person's images in our investigation and examine the individual's mind in many processes. Computing versions is essentially regarded to be one of the most difficult fields. Developers need to adopt automated or semi-automatic processes to such fields and with no contact between the users. Our proposed job will reveal all sorts of ways to achieve good outcomes. We employ images with devices using the capabilities and concepts of IoT in our research study.

Keywords: IOT; Face recognization; Smart home; Object tracking

Introduction

IOT is the combination of hardware and software. IOT Figure 1 is mostly built as the underlying architecture using R programming or programming environment. MAT Lab programming the hardware devices. The information generated on the webserver or public cloud is protection provided on the IOT devices. Elements such as sensors, servers, equipment, programming, and Access to the internet are part of the IOT. Designers just had to develop smart gadgets day by day to function naturally without any contact between users. These things are considered smart objects.

Recently, in this contemporary culture, domestic protection is a difficult duty. The notion of image recognition is utilized to safeguard the location safely to address this problem. A frame for face recognition is a frame that collects and validates an individual's character by using a state-of-the-art camera.

The device that recovers face pictures and validates people's actions using a push sensor has been face affirmations architecture. One approach to deal with this is to gather pictures from the picture and from a database in which pictures from across all sides are being saved. Throughout the event that alternative biometric structures are

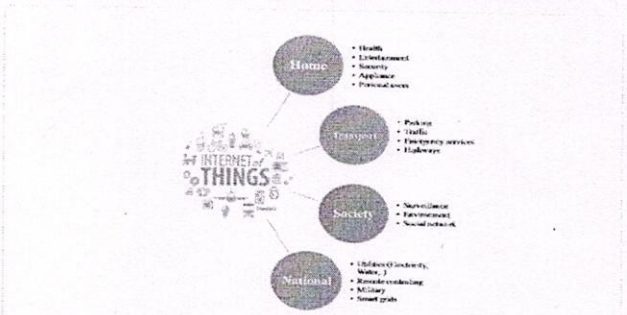

Figure 1: IOT for various applications.

developed utilizing a good paper printed and iris, start standing up for affirming that its contact-free handling has undeniable perfect circumstances. Typically it is utilized as a safety component that can differ from other biometrics. As corporate evidence and advertising device, it has also become common Figure 2.

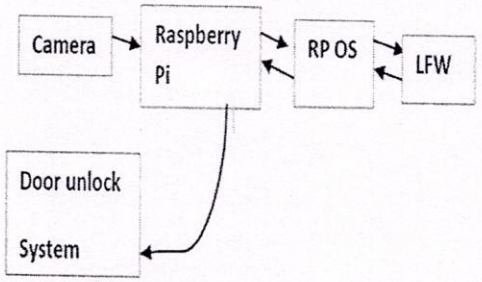

Figure 2: Proposed design.

Literature Survey

Internet for stuff

Moreover, this phrase, considered the Internet of things, refers to a centralized context between many aspects. Technologies that power IOT are distinct:

Designers used it here Single board PC's raspberries pi 3. The pi has several ages. Raspberry Pi. In the supplementary enterprise, Raspberry pi3 Figure 3 had a speeder of around 80 percent compared to RPi2. The RPi3 storage capacity is 1054 MB and the maximum throughput is opened on a modest scale via SDHC. It has an additional Wi-Fi element on Wireless headphones in comparison to various Pic Microcontroller versions.

IBM Blue mixture is indeed an administrator free of charge (Peas) for IBM Cloud Storage. It supports multiple languages and administration, as do coordinated divides, to produce, operate, convey and handle a broad variety of cloud uses. The blue mixture is based on an open technology from Cloud Foundry and continues to work on the frame of the Thin Layer. A few software dialects include Java, Python, etc. Blue Mix is supported.

*Corresponding author: Lokeswara Reddy, Professor, Department of Computer Science and Engineering, K.S.R.M College of Engineering, Yerramasu Palli, Tadigotla, YSR Kadapa, Andhra Pradesh-516004. E-mail id: vlreddy74@gmail.com

Received date: August 31, 2021 Accepted date: September 15, 2021 Published date: September 22, 2021

ECS Transactions, 107 (1) 19265-19277 (2022)
10.1149/10701.19265ecst ©The Electrochemical Society

32

REGRESSION ANALYSIS ON COMPACTION CHARACTERISTICS OF SAND CLAY SOILS

V.Giridhar[1],Prof G.Jagadeesh[2],P.Rajendra Kumar[3]

1
Professor Department of Civil Engineering KSRM College of Engineering, Kadapa,A.P.,Email ID:drgiridhar@ksrmce.ac.in

2
PG Scholar Department of Civil Engineering KSRM College of Engineering, Kadapa,A.P.,Email ID:gjagadeesh48@gmail.com

3
Asst professor Department of Civil Engineering KSRM College of Engineering, Kadapa,A.P

Soil compaction is one of the major geo technical engineering application in infrastrructure development of the nation. large volumes of soil are used in the construction of flyovers, earth dams and railways. There is a need to understand comprehensively in a unified and coherent manner. Thus the knowledge of compaction behavior and its characteristics of fine grained soils at different compaction energies assume great importance from they viewpoint of practical significant.In the present work, compaction parameters such as (MDD)(max)and optimum moisture content (OMC)are determined at various compaction engies by conducting the laboratory compaction tests. In the field, the compaction of soils usually involves using different compaction energies.A limited experimental investigation has been taken up in the present study. The cardinal aim of the present study is to focus on effect of compaction energy on the behavior and compaction characteristics and unconfined compressive strength (qu) of soils.

Keywords:Free swell index, UCC ,Liquied limit and plastic limit,proctorcompaction.

Introduction

Compaction is commonly performed in such engineering projects as highways, railway sub grades, airfield pavements,earth dams and landinfill linears. In the field, soil are usually compacted using tampers, rollers- tired rollers and other equipments. In the laboratory, soil compaction is usually performed using the impact proctor compaction apparatusThe value of compaction as apractical method to controlstrength,compressibilityande.t.characteristics of fine grained soils has been amply attested by the fact that it is in use since the time when the early earth strature were built.every day, million of cubic meters of soils simple viable mean of effecting marked changes in engineering properties of soils economically. Properly placed and compacted soil mass has strength and stability that are as goog or even better than many natural formations. Soils in their as condition are partly saturated.Compaction is a simple process of densification by expulsion of air using mechanical manipulation. This is in contrast to densification by consolidation by expulsion of water under an external load. The consideration process is very much slower, because of high permeability to air and possible internal drainage for water.For a given soil , the dry density that can be realized by compaction effort and the moulding water content.typical dry density- water content relationships which is normal refered as compaction curves,. The dry density- moisture content relationship of soil obtained from laboratory tests from the basic for spccification and field compaction control.Attempts have been made by several researchers to explain the characteristics of compaction curves. The notable ones are proctor (1993), hogentogler (1936), Hilf (1956),

Journal of Building Pathology and Rehabilitation (2022) 7:31
https://doi.org/10.1007/s41024-022-00169-y

RESEARCH ARTICLE

Design optimization of non-overflow section of a concrete gravity dam

Batta Jaya Naga Satish[1] · Chava Venkatesh[2] · B. Anitha Reddy[3] · Komma Hemanth Kumar Reddy[4] · Ramamohana Reddy Bellum[5]

Received: 20 June 2021 / Revised: 22 December 2021 / Accepted: 1 February 2022

Abstract

The ever-increasing demand for concrete used in the construction and infrastructure field leads to increasing global pollution over the decades. Hence, the construction field should look always for using its raw materials in sustainable ways without affecting the functionality of the structure. Design optimization is one such decision-making strategy in providing an engineered solution with maximum reliability, environmental sustainability and cost efficiency of constructed facilities. In the present study, the design optimization of a non-overflow section of a concrete gravity dam has been studied. The modelling and analysis of the non-overflow section of the concrete gravity dam have been carried out in the FEM package ANSYS along with appropriate algorithms. The parameters considered for the algorithmic optimization of the typical dam section are geometrical properties of the Dam as design variables (for fixed height and freeboard) to minimize the volume of concrete without compromising on loading and factor of safety requirements as per IS code provisions. The current work is focused on optimizing the non-overflow section of a concrete gravity dam by the reduction in its volume, to its weight which is always in direct proportion. Decreasing the dam's weight is must both from the sustainable design and economical point of view. All effective load combinations (as per IS: 6512-2003) where the dam is subjected to maximum loads under ideal operating conditions are considered for stress analysis and optimization. The results of the optimization are presented and discussed in this paper. This study observed that the reduction of 9.95% weight of non-overflow section for concrete gravity dam without actually compromising on the increased factor of safety, which is in association with its functioning under standard normal operating conditions subjects to IS code provisions. Also, green house gas CO_2 emission can be reduced, indicating the sustainable design solution for massive constructions like concrete gravity dam.

Keywords Concrete gravity dam · Design optimization · Non-overflow section · Sustainable design · CO_2 emission

1 Introduction

The ever-increasing demand for concrete used in the construction and infrastructure field leads to increasing global pollution over the decades. Hence, the construction field should look always for using its raw materials in sustainable ways without affecting the functionality of the structure. Design optimization is one such decision-making strategy in providing an engineered solution with maximum reliability, environmental sustainability and cost efficiency of constructed facilities. Since the construction of massive concrete structures such as Dams and Bridges consumes a large amount of concrete, Design optimization for minimization of construction costs and environmental impact has been attracted in recent years [1–4]. Concrete is most commonly used for civil infrastructures and buildings, is a composite

✉ Batta Jaya Naga Satish
satishbjnvignan@gmail.com

1 Megha Engineering and Infrastructures Limited, Hyderabad 500037, India

2 Department of Civil Engineering, CVR College of Engineering, Ibrahimpatnam, Hyderabad, Telangana 501510, India

3 Department of Applied Engineering, VFSTR University, Vadlamudi, Guntur, Andhra Pradesh, India

4 Department of Civil Engineering, K.S.R.M College of Engineering, Kadapa, Andhra Pradesh 516003, India

5 Department of Civil Engineering, Aditya Engineering College, Aditya Nagar, ADB Road, Surampalem, E.G District 533437, India

Published online: 03 March 2022

Water Budget Estimation in Water Resources Management in Drought Prone Areas in Rayalaseema Region, South India

Dr.T. Kiran Kumar[1], K. Niveditha[2]

[1]Professor, Department of Civil Engineering, K.S.R.M. College of Engineering (Autonomous), Kadapa, Andhra Pradesh, E-mail: kiranced@ksrmce.ac.in
[2]Asst. Prof., Department of Civil Engineering, K.S.R.M. College of Engineering (Autonomous), Kadapa, Andhra Pradesh, E-mail: niveditha@ksrmce.ac.in

Abstract. Water is a valuable natural resource, fresh water is vital for health and to the economy, and reliable access to it is becoming increasingly important as the India's population rises. Yet its availability is limited, per capita accessibility of useable water is depleting, but with increasing living standard of people, all around fast industrial development and expansion, necessity of fresh water is raising high continuously. Water audit is a successful tool for minimizing losses, working on different utilizations and in this way empowering water conservation in irrigation, domestic, power and industrial as well. Water audit controls the measure of water lost from a distribution system because of spillage and different reasons like burglary, unapproved withdrawals from the organizations and the cost of such misfortunes to the utility. Water budget is a bookkeeping of all the water that streams into and out of an undertaking region of project area. Water budget gives the financial aspects on the distribution of quantity of water in Rayalaseema region. The study area this paper to calculate the water budget in the study area of 51 Mandal of Rayalaseema region and based on the water quantity analysis to prepare water, soil conservation structures in study area, for effective water management

Index Terms—Water data, Resources, Drought, South India.

1. Introduction

However fresh water is vital for health and to the economy, and reliable access to it is becoming increasingly important as the India's population rises. Yet its availability is limited, per capita accessibility of useable water is depleting, but with increasing living standard of people, all around fast industrial development and expansion, necessity of fresh water is raising high endlessly.

Majority of the study area mainly depends on groundwater as its primary source of drinking and irrigation water. Several water resource studies concerning to improve the standard of regional water resources in precise, and offer better description of the water cycle, available water level, the flow system and water demand, and factors affecting sustainability. The rain fall is usually measured in inches or mm or centimeters. The rain falls averages based on the daily rain fall measurements. The daily rain fall defined as 24 hour accumulated amount of rain on a day. The rain fall is highly variable from day to day.

Real assessment of excess is the essential and primary information need for the plan of recharge structures of optimal capacity . Unrealistic excess assessments of catchments yield frequently prompts to construction of larger than usual or small structures, which, regardless should be kept away from.

Materials Today: Proceedings 49 (2022) 2136–2142

Contents lists available at ScienceDirect

Materials Today: Proceedings

journal homepage: www.elsevier.com/locate/matpr

Characteristics of MHD Casson fluid past an inclined vertical porous plate

Ramachandra Reddy Vaddemani [a,*], Raghunath Kodi [b], Obulesu Mopuri [c]

[a] Department of Humanities and Sciences, K.S.R.M college of Engineering, Kadapa, A.P 516003, India
[b] Department of Humanities and Sciences (Mathematics), Bheema Institute of Technology & Science, Adoni, A.P 518301, India
[c] Department of Mathematics, Siddharth Institute of Engineering & Technology, Putur, A.P 517583, India

ARTICLE INFO

Article history:
Received 14 June 2021
Accepted 29 August 2021
Available online 15 September 2021

Keywords:
Magnetic Field
Casson Fluid
Slip Flow Regime
Thermal Diffusion and Chemical Reaction

ABSTRACT

This paper addresses the effects of Soret on unsteady free convection flow of viscous incompressible fluid through a porous medium with high porosity bounded by a vertical infinite moving plate under the influence of thermal diffusion, chemical reaction, and heat source. The fluid is considered to be gray, absorbing, and emitting but non-scattering medium. Rosseland approximation is considered to describe the radiative heat flux in the energy equation. The dimensionless governing equations for this investigation are solved analytically using perturbation technique. The effects of various governing parameters on the velocity, temperature, concentration, skin-friction coefficient, Nusselt number and Sherwood number are shown in figures and tables and analyzed in detail. It was noticed that velocity distribution increased with increasing buoyancy parameters; temperature decreased with increasing Prandtl number, and concentration decreased with increasing the Schmidt number and chemical reaction parameter.

Selection and Peer-review under responsibility of the scientific committee of the Global Conference on Recent Advances in Sustainable Materials 2021.

1. Introduction

When using a liquid Casson model to analyze non-Newtonian w, and it vanishes in zero rates of stress as well as the infinite rate of stress, it becomes a sticky fluid with zero viscosity, at an unlimited rate of shear; it becomes a liquid with yield stress below zero thickness with no flows occurring. If yield stress more extraordinary than- or equal to the shear stress is added to a fluid, it acts like a solid. But, if yield stress less than or equal to the shear stress is applied and a fluid begins to shift. There are examples of Casson Liquids like tomato sauce, jam, high concentration of fruit juice, honey, blood, etc. Shehzad et al. [1] found that the MHD Casson flow through the rigid vessel motor when electrochemically applied resulted in mass transfer effects on the inlet-side MHD. A paper written by Vajravelu et al. [2] looked at a fluid that flows across a surface which may disrupt emergent chemicals and mechanical stresses. In a research Abid et al. [3] performed by the unsteady flow of a Casson fluid and oscillating heat transmission of a Newtonian heater is studied. Sekhar et al. [4] modeled fluid movement past moving plates using computer codes and studied semi-infinite moving plates found in nature and have implications for power plant design. Animasaun's [5] performed by is carried out with the non-de-Dhyrative HFM convective heat and mass transfer of dissipater Casson flow can show increases in temperatures, viscosities, and thermal conductivities on the order of chemical reactions which cannot be accurately predicted from theory. Natural convection, also known as free convection, is a spontaneous movement caused by non-homogeneous fields with volumetric forces such as Coriolis, MHD, magnetic, centrifugal, etc. Several scholars have investigated this effect. Free/natural convection flow has a wide variety of functional applications and environmental conditions, including chilling of electronic equipment, geothermal systems, material handling, thermal insulation designs, energy system protection, ambient flows, and air conditioning systems. Furthermore, heat transfer systems, including the movement of material in a flowing fluid medium, have diverse real-world applications. On the planet, specific flows are influenced not only by temperature fluctuations but also by concentration variations. Buoyancy is often essential in atmospheric science, where differences in land and air temperatures can lead to complicated flow shapes. Because of its multiple applications in industry, science, and engineering processes, the analysis of the combined

* Corresponding author.
E-mail addresses: vrcreddymaths77@gmail.com (R.R. Vaddemani), kraghunath25@gmail.com (R. Kodi), mopuriobulesu1982@gmail.com (O. Mopuri).

https://doi.org/10.1016/j.matpr.2021.08.328
2214-7853/
Selection and Peer-review under responsibility of the scientific committee of the Global Conference on Recent Advances in Sustainable Materials 2021.

Received: 24 June 2021 | Revised: 18 November 2021 | Accepted: 4 December 2021

DOI: 10.1002/htj.22423

ORIGINAL ARTICLE

HEAT TRANSFER WILEY

Unsteady MHD fluid flow past an inclined vertical porous plate in the presence of chemical reaction with aligned magnetic field, radiation, and Soret effects

Kodi Raghunath[1] | **Nagesh Gulle**[2] | **Ramachandra Reddy Vaddemani**[3] | **Obulesu Mopuri**[4]

[1]Department of Humanities and Sciences, Bheema Institute of Technology and Science, Adoni, Andhra Pradesh, India

[2]Department of Mathematics, Srinivas Ramanujan Institute of Technology, Anantapur, Andhra Pradesh, India

[3]Department of Humanities and Sciences, K.S.R.M College of Engineering, Kadapa, Andhra Pradesh, India

[4]Department of Mathematics, Siddharth Institute of Engineering & Technology, Puttur, Andhra Pradesh, India

Correspondence
Kodi Raghunath, Department of Humanities and Sciences, Bheema Institute of Technology and Science, Adoni, Kurnool Dist, Andhra Pradesh 518301, India.
Email: kraghunath25@gmail.com

Abstract

The aim of the present paper is to investigate the Soret effect due to mixed convection on unsteady magnetohydrodynamics flow past a semi-infinite vertical permeable moving plate in the presence of thermal radiation, heat absorption, and homogenous chemical reaction subjected to variable suction. The plate is assumed to be embedded in a uniform porous medium and moves with a constant velocity in the flow direction in the presence of a transverse magnetic field. The equations governing the flow are transformed into a system of nonlinear ordinary differential equations by using the perturbation technique. Graphical results for the velocity distribution, temperature distribution, and concentration distribution based on the numerical solutions are presented and discussed. Also, the effects of various parameters on the skin-friction coefficient and the rate of heat transfer in the form of Nusselt number, and rate of mass transfer in the form of Sherwood number at the surface are discussed. Velocity distribution is observed to increase with an increase in Soret number and in the presence of permeability, whereas it shows reverse effects in the case of the

(37) Scopus

Nat. Volatiles & Essent. Oils, 2021; 8(5): 8410 - 8416

NVEO
Natural Volatiles & Essential Oils

Synthesis of novel phosphorylated derivatives of Tenefovir Intermediate and their antiviral activity

K. Venkata Ramana*[a], I. Sreevani[a], C. Naga Raju[b] K. Venkata Subbaiah[c],

[a]Department of Chemistry, KSRM College of Engineering, Kadapa – 5165003, India.
[b]Department of Chemistry, Sri Venkateswara University, Tirupati – 517502, India.
[c]Department of Virology, Sri Venkateswara University, Tirupati – 517502, India.
*Corresponding author: drkvr@ksrmce.ac.in

ABSTRACT

A series of new phosphorylated compounds **5a-j** were synthesized by the sequence of chemical reactions. Initially, Tenofovir intermediate **(1)** was treated with 4-chlorophenyl phosphorodichloridate **(2)** to form an intermediate **3.** Secondly, the intermediate **3** on reaction with various amino acid esters **(4)** in presence of dry THF/Py and *N,N*-dimethyl piperazine afforded the title compounds.The spectral data and elemental analyses were confirmed to the title compounds **5a-j** and further tested for their antiviral activity against with reference standards Blue Tongue Virus (BTV) and New Castle disease Virus (NDV). The **5e, 5g** and **5i** compounds have exhibited potent activity against BTV and **5b, 5d, 5e, 5f** and **5h** have shown moderate activity against NDV.

1. Introduction

The ANPs are nucleotide analogs and form stable P-O bond through side aliphatic chain with phosphorus [1]. These exhibit cytostatic [2], anti-parasitic [3] and stimulates the immune system properties [4]. Mainly, cidofovir, adefovir and tenofovir drugs are active portion of effective antiviral agents used for treatment of viruses caused diseases are hepatitis B and AIDS [5]. These nucleosides abilities are dependent on their biolgical evaluation of cellular kinases to the respecting mono, di and triphosphates [6]. The aminoacid ester bonded of P-O at phosphorous compounds are essential category of irrationally designed and synthesized medicine possess anti-neoplastic activities [7]. The researchers are focused on to design and development of therapeutic drugs by using the phosphorylation step. This method has better results in the synthesis of new potent drugs of nucleotide derivatives [8, 9]. Some of the prodrugs are proven for the treatment of anti viral infections [10]. Mono-phosphoramidate or bis-amidate nucleosides of prodrugs exhibited anti HIV properties [11]. Cyclic nucleoside phosphonate is found to inhibit HIV reverse transcriptase and their derivative of the prodrug as a auspicious drug [12]. Ballatore *et al.* reported the phosphonamidate prodrugs of tenofovir found to better results than ANPs [13], and prodrug of tenofovir enhances the antiviral properties [14]. Isopolar phosphonomethyl group having nucleotide derivatives have enzymatic problems controlled by intra cellular phophorylation of nucleoside stimulation. Particularly, the compounds [(R)-2-phosphonomethoxypropyl]adenine's are active in opposition to retroviruses [15]. The modified nucleotide's are exhibiting virus-inhibitory activity, which subsequently act as terminators of the growing DNA chain [16]. In this view, we have great interest to report a class of new phosphorylated

The relevance of Writing in Communicative Language Teaching - An Overview

K. Eswara Reddy[1], K. Vijaya Bhaskar Reddy[2],Dr.K.Ramesh Rao[3],A.Ananda rao[4]
[1]Asst.Prof of English, Dept of H&S, KSRM College of Engineering, Kadapa, AP
eswar@ksrmce.ac.in
[2]Asst.Prof of English, Dept of H&S, KSRM College of Engineering, Kadapa, AP
bhaskar@ksrmce.ac.in
[3]Asst.Prof of English, Dept of H&S, KSRM College of Engineering, Kadapa, AP
saiharinath7@gmail.com
[4]Asst.Prof of English, Dept of H&S, KSRM College of Engineering, Kadapa, AP
anand@ksrmce.ac.in

Abstract:

In this era of data and conversation technology, the explosion of human beings' abilities is extra in demand. Communication abilities are essential and considered as salient factors of Global success. Globalization has bolstered the relation between education and employment. The graduates with tremendous conversation skills in English are in high-quality demand in the job market. Though we have numerous approaches and methods, learners still make mistakes in spoken and written communication. Communicative teaching is an approach to the teaching of second and foreign languages, highlighting communication as respectively the potential and therefore the eventual purpose of learning a language. Making utterances in each spoken and written language is considered as the main objective. The researcher has focussed on the relevance of writing in a communicative approach, for the reason that writing is the hardest talent among different language skills for second and foreign language learners.

Keywords: Communicative Competence, Writing skill, Communicative Language Teaching

The relevance of Writing in Communicative Language Teaching - An Overview

Communicative Language Teaching

The roots of Communicative Language Teaching are found in British culture from the 1960s. Until that, Situational instructing spoken was the foremost British approach to teach English. The basic structures play a major role in Situational teaching based on deeds. Later on, Communicative Language Teaching was considered as the best procedure. It may be a used teaching approach in Britain. Having been included inside the 1970s, it's finished up a well-liked approach abroad dialect direction since the Eighties. Numerous researchers have helped to develop

Application of Taguchi-Based Grey System for Multi Aspects Optimization on Wire Electric Discharge Machining of Aluminum-Graphene Nanoplatelets Composites

Aluminum Metal Matrix Composite (AMMC) materials have loftier individualities and are known as an alternative material for a range of aerospace and automotive engineering applications. Reinforcement inclusion makes the components tougher, resulting in low performance of machining by traditional conservative machining practices. The present study presents a detailed review of the machinability of AMMC (Pure Aluminum + Graphene nanoplatelets) using Wire Electric Discharge Machining (WEDM). For WEDM of AMMC, a multi-objective optimization method is proposed to evaluate possible machining parameters in order to achieve better machining efficiency. Taguchi's approach to the design of experiments is used to organize the experiments. For performing experiments, an L27 orthogonal array was selected. Five input process variables were considered for this study. The Grey Relational Analysis (GRA) is used to achieve the best features of multi-performance machining. The experimental results show that the proposed multi-objective optimization approach greatly improves the features of multi-performance machining.

Record URL:
https://doi.org/10.4271/01-15-01-0003 (https://doi.org/10.4271/01-15-01-0003)
Availability:
Find a library where document is available. Order URL: http://worldcat.org/issn/19463855 (http://worldcat.org/issn/19463855)
Supplemental Notes:
Abstract reprinted with permission of SAE International.
Authors:
Prakash, P
Mahesh, R
Rajesh, D
Babu, D
Devika, B
Publication Date: 2021-10-11

Language

English

Media Info

Media Type: Web
Features: References;

(40)
Scopus

Materials Today: Proceedings
Volume 52, Part 3, 2022, Pages 1461-1465

Optimization of drilling process parameters for self-lubricants reinforced aluminium metal matrix composites

A. Saravanakumar [a], P. Sreenivas [a], S. Vijaya kumar [a], U. Pradeep kumar [a], L. Rajeshkumar [b] [c] ✉

Show more

Outline | Share | Cite

https://doi.org/10.1016/j.matpr.2021.11.196

Abstract

Aluminium matrix composites (AMCs) find a wide spectrum of application in various fields of engineering and technology. Owing to the below par inherent characteristics of unreinforced AMCs, reinforcements are used to improve the characteristics of AMCs. Reinforcing the self-lubricating graphite (Gr) and molybdenum disulphide (MoS_2) in aluminium matrix was found to improve the machinability and surface finish of the composites which in turn enhances the application prospects. In the current investigation, aluminium alloy 2219 (AA2219) was reinforced with Gr and MoS_2 and the composites were fabricated by conventional casting technique. Drilling behavior of the composites were investigated by conducting drilling experiments in CNC machining center and surface roughness of the holes were measured. Experiments were designed by full factorial method. Results of the experiments portrayed that the composites with Gr as reinforcement exhibited better drilling behavior when compared with MoS_2 reinforced AA2219 composites.

Previous Next

(41) Sastry.

2021-07-06

Influence of Graphene Nanoplatelets Addition on Microstructural and Mechanical Properties of Pure Aluminum through Ultrasonic-Assisted Stir Casting Technique 05-15-01-0001

This also appears in SAE International Journal of Materials and Manufacturing-V131-5EJ

Using an ultrasonic-assisted stir casting method, a pure aluminum (Al) matrix (99% purity) was mixed with Graphene Nanoplatelets (GNPs) in various proportions ranging from 0.5 wt.% to 2.0 wt.% to create a Metal Matrix Composite. The microstructural and mechanical behavior of pure Al-graphene composites were studied experimentally, and it was discovered that Al with 1.0 wt.% graphene composite exhibits improved mechanical properties, with a 38.80% increase in tensile strength and a 56.07% increase in microhardness. Furthermore, field-emission scanning electron microscope (FESEM) and transmission electron microscope (TEM) were used to inspect the composites' exterior morphology, and fractography of the tensiled composites, as well as X-ray diffraction (XRD) analysis, was used to observe the materials' stage changes. According to the failure review, uniform graphene scattering in the parent matrix combined with negligible porosity resulted in a substantial improvement in mechanical properties, making it ideal for aerospace applications.

DOI: https://doi.org/10.4271/05-15-01-0001

Citation: Prakash, P., Subbaiah, K., Dodda, R., Murthy, V. et al., "Influence of Graphene Nanoplatelets Addition on Microstructural and Mechanical Properties of Pure Aluminum through Ultrasonic-Assisted Stir Casting Technique," *SAE Int. J. Mater. Manf.* 15(1):3-12, 2022, https://doi.org/10.4271/05-15-01-0001.

42

Sign

Materials Today: Proceedings
Volume 61, Part 2, 2022, Pages 224-231

Impact of waste ceramic tiles as partial replacement of fine and coarse aggregate in concrete

A. Sivakumar [a], S. Srividhya [b], V. Sathiyamoorthy [c], M. Seenivasan [d], M.R. Subbarayan [e]

Show more

Outline | Share Cite

https://doi.org/10.1016/j.matpr.2021.08.142

Abstract

A substantial amount of ceramic waste is generated in the form of damaged or broken ceramic products. Minimizing solid waste disposal is one of the potential solutions to a cleaner environment. Because of its interesting applications and low cost, the use of solid wastes in sustainable construction has received a lot of attention. The employment of waste ceramic as a fine and coarse aggregate replacement was studied in this current research. Specimens with ceramic waste as fine and coarse aggregates at varying percentage levels of 0%, 10%, 20%, 30%, 40%, and 50% was prepared for the current study. The influence of ceramic fine and coarse aggregate on the characteristics of concrete was investigated using fresh, mechanical, and durability properties. Based on the findings, the optimal aggregate replacement level ratio was found to be 20%. When optimized quantity of 20% ceramic waste was used in concrete, the compressive strength, split tensile strength, and flexural strength were higher than that of the other mixtures. The strength of the concrete was lower with higher quantities of ceramic waste replacement than with the conventional mix.

Previous Next

Keywords

(43)

Sup

An MOORA and WASPAS Methods Application for Optimal Material Selection from Aluminum Graphene Nano Platelets Composites

Bhanu Prakash Palampalle[1], D. Ravikanth[2], D. Merwin Rajesh[2], B. Devika[2] and D. Babu[2]

ECS Transactions, Volume 107, Number 1

Citation Bhanu Prakash Palampalle *et al* 2022 *ECS Trans.* **107** 19187

[1] , K.S.R.M. College of Engineering, Kadapa

[2] n/a

https://doi.org/10.1149/10701.19187ecst

Abstract

Improved features include a high strength-to-weight ratio and good wear resistance, and so on, aluminium MMCs are favoured over other traditional materials in aerospace, automotive, and marine applications. Mechanical, electrical, electronic, and thermal properties of graphene make it an excellent metal composite reinforcement material. Stir casting, powder metallurgy, and other techniques were used to strengthen pure aluminium Graphene nano-platelets in a base matrix (pure Al) with various weight percentages to form aluminium metal matrix composites. The mechanical properties of the aluminium matrix are greatly improved by the uniform distribution of Graphene Nano platelets .

(44)
UGC Can I..

IMPACT AND PERCEPTION TOWARDS ARTIFICIAL INTELLIGENCE (AI) ON HRM PRACTICES –WITH REFERENCE TO SOFTWARE COMPANIES IN HYDERABAD

***B.Venkata Lakshmi**

Abstract:

Social trends and information technology are creating pressure, resulting in organizations being forced to update and recreate themselves. Artificial intelligence (AI) is a distinct division of science and technology which has been drilled beneficially over the past few years in many arenas. While artificial intelligence is making its mark in almost all areas, human resources practices are not an exception. Human resource management (HRM) is one vital department in every company. Some Human resource (HR) experts suppose that elevated AI is a hazard to personnel community and in the forthcoming eras AI would expressively decrease the demand for HR worldwide. In disparity, some investigators trust that AI is sophisticated tools meant to assist personnel and it can never substitute to Human resource. The main purpose of this research is to examine Impact and employee's perception towards AI on HRM practices. For the present study the data has been collected through online survey. To analyze date SPSS 24 software application was used. Statistical techniques like Reliability test, Descriptive statistics ANOVA were used. Simple random and convenience sampling method was used to collect responses.

Keywords: *Impact, Perception, Artificial intelligence Science and technologies, Human resources practices.*

INTRODUCTION

Tecuci (2012) mentions that Artificial Intelligence (AI) is a rapidly evolving technology, made possible by the Internet, that will soon have major impacts on our daily lives. The name of Artificial Intelligence was verified in 1956 (Stuart & Norvig, 2016). The adoption of technology has reached a point where we are ready for a radical shift, and this digital transformation of the industry is something we call as Industry 4.0(fourth industrial revolution). Fourth industrial revolution which is also known as the intelligent industry is considered to be the fourth industrial revolution. Industry 4.0 seeks to transform an institute into an intelligent one to accomplish the top possible corporate results. The present study tries to examine impact and human resource personnel's perception of Artificial Intelligence on human resources management practices.

Journal of the Oriental Institute, ISSN: 0030-5324, UGC CARE LIST NO. 135,
Vol. 71, Issue. 02, No.13, 2022, pp. 127-134

*Assistant. Professor, Department of Humanities & Sciences, K.S.R.M.College of Engineering (Autonomous), Kadapa.

lakshmireddy.sl@gmail.com

Innovative Infrastructure Solutions (2022) 7:173
https://doi.org/10.1007/s41062-022-00788-x

TECHNICAL PAPER

Seismic performance of a truss bridge with different substructure configurations

Batta Jaya Naga Satish[1] · B. Anitha Reddy[2] · Chava Venkatesh[3] · Komma Hemanth Kumar Reddy[1] · Ramamohana Reddy Bellum[4]

Received: 28 April 2021 / Accepted: 20 February 2022

Abstract

In the present study, the seismic responses of typical railway truss bridges have been investigated using different types of substructure configurations such as single-column bent, multi-column bent and linked-type column configurations. A nonlinear static pushover analysis method is employed to assess the performance of all three substructure configurations using yield strength, yield displacement and ductility capacity as parameters under design basis earthquake and maximum credible earthquake levels. In addition, to provide more comprehensive insights, the collapse margin ratio has been calculated and compared for all three substructure configurations. The results indicated that the performance level is immediate occupancy. For single-column bent configuration, it is elastic for multi-column and linked column bent configurations in transverse and longitudinal directions. Ductility capacity has been calculated and reported higher in single-column bent configuration and lower in multi-column bent configuration for the seismic force in the longitudinal direction. In the transverse direction, ductility is higher in linked column configuration and lower in a single-column bent configuration. The collapse margin ratio observed to be higher for the linked column configuration than the other two configurations. The result shows that the performance of linked column bent configuration is seismically safe and can be used as an effective substructure configuration for the bridge located in high seismic prone regions.

Keywords Earthquakes · Bridges · Substructure configuration · Nonlinear static pushover · Performance level · Collapse margin ratio

Introduction

Railway and highway bridges are playing a crucial role in transportation systems as significant transportation modes. The performance of bridges under major earthquakes depends on their energy-dissipation capacity. Weak beam strong column building philosophy is adopted for energy dissipation. However, bridges designed to bear the damage and plastic hinges need to be formed in abutment and piers or only in piers for energy dissipation. Furthermore, it is necessary that under gravity loads, inelastic actions should be at available locations and should not cause any failure. For earthquake-resistant design, damage should not occur in brittle mode and should be in ductile mode. It is achieved using the capacity design method to avoid undesirable failure modes [1]. The behavior of bridges during earthquakes depends upon bridge type and substructure configuration. If the substructure configuration varies significantly along the longitudinal direction, the stiffness of each span changes

✉ Batta Jaya Naga Satish
satishbjnvignan@gmail.com

B. Anitha Reddy
anithareddy.bogasamudram@gmail.com

Chava Venkatesh
chvenky288@gmail.com

Komma Hemanth Kumar Reddy
kommahemanthreddy@gmail.com

Ramamohana Reddy Bellum
rammohanbellum92@gmail.com

[1] Department of Civil Engineering, VFSTR Deemed to be University, Guntur, India

[2] Department of Applied Engineering, VFSTR Deemed to be University, Guntur, India

[3] Department of Civil Engineering, CVR College of Engineering, Hyderabad, India

[4] Department of Civil Engineering, Aditya Engineering College, Surampalem, India

Published online: 07 March 2022