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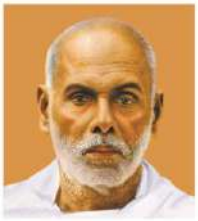

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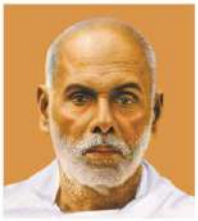

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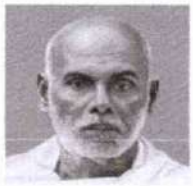

Publication of Conferences

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22	Computational prediction of plastic degrading microbes using random forest	Dr.Raji Sukumar	2023
23	Computational yield prediction of rice using KNN regression	Dr.Raji Sukumar	2023
24	Computational model for pepper yield prediction using support vector regression	Dr.Raji Sukumar	2023
25	A wideband Dipole Antenna for head Imaging system	Sini Namath	2023

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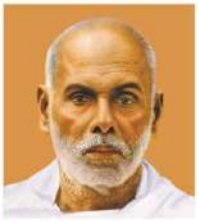

ACADEMIC YEAR

2023-2024

2023-24

Computational Model for Pepper Yield Prediction Using Support Vector Regression

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The yield prediction is the one of the challenging problem in agriculture. Here in this research work we have predicted the yield of Pepper in the state of Kerala, India. With the help of Machine Learning and by considering the soil properties, micro climatic condition and area of the Pepper we have predicted the yield. Here we have used Linear Regression and Support Vector Regression algorithms in order to predict the pepper yield. Experimental results gave best accuracy of 97.685 percent for Support Vector Regression.

Keywords: Agriculture, Pre-processing, Analysis, Regression, prediction.

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Chapter 22
Computational Prediction of Plastic Degrading Microbes Using Random Forest

N. Hemalatha, W. Akhil, Raji Vinod, and T. Akhil

1 Introduction

Plastic is nothing but a polymeric material. Plastic pollution has become one of the most stressing environmental issues, as the rapidly increasing production of disposable plastic products overwhelms the world's ability to deal with them. We cannot think of a life without plastic. Plastics revolutionized medicine with life-saving devices, made space travel possible, lightened cars, and jets saved fuel and pollution, and also saved lives with helmets, incubators, and equipment for clean drinking water but on the other side, it makes a lot of environmental pollution [1]. Practically it is difficult to avoid plastic completely from our daily life. The only solution to control plastic pollution is degrading the plastic products rather than throwing them into the surroundings. Using the proper management, we can reduce the pollution in the environment more than what plastic creates.

Streptococcus, Micrococcus, Staphylococcus, Moraxella, and *Pseudomonas* are some of the plastic-degrading microbes found in Indian mangrove soil [2]. This outcome was a result of Japanese scientists in the year 2016 in which they found that a bacterium can easily break the plastic polyethylene terephthalate (PET) [3]. Further, they also found another bacterium called Ideonella sakaiensia obtained from the genus Ideonella and from the family Comamonadaceae which can break the plastic polyethylene terephthalate (PET) [4]. Once the bacterium acts, PET gets broken down

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P. K. Shukla et al. (eds.), *Computer Vision and Robotics*, Algorithms for Intelligent Systems, https://doi.org/10.1007/978-981-19-7892-0_22

Chapter 23
Computational Yield Prediction of Rice Using KNN Regression

N. Hemalatha, W. Akhil, and Raji Vinod

1 Introduction

Machine learning, a subset of Artificial Intelligence (AI), is a practical method using several features for yield prediction. Machine learning (ML) can be used to find patterns and discover correlations among these data from datasets. In ML, models have to be trained using given datasets, where the outcomes will be characterized based on past experience. Several features are used to build the predictive models and as such, model parameters are calculated using historical data during the training phase [1]. For the testing purpose, historical data that is not used for training is used for the evaluation phase.

An ML model can be descriptive or predictive depending on the research problem. A descriptive model on one side is used to gather knowledge from the collected data, while predictive models are used for future prediction. Lots of challenges are faced in building a high-performance predictive model which involves choosing the right algorithm and also handling the voluminous amount of data. In this paper, we are analyzing the past yield of rice and predicting the future yield with the help of certain agricultural features in the state of Kerala with the help of ML.

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2023 - 24

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A Wideband Dipole Antenna for Head Imaging System

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***Abstract*—One of the fundamental aspects of all wireless communication is antenna. Biomedical engineering occupies a prominent position in the academic field of medical treatment and diagnostics. Antenna is implanted in the human body to transmit and receive power. In a microwave head imaging arrangement, EM energy be targeted at the skull, according to an aerial assemblage, and then the dispersed EM signals be analyzed to create an internal image of the human head. The human head's regular and irregular tissues' received electrical characteristics are used to rebuild the image. From microwave skull tomography, dispersed signals are collected from the aerial, the aim is identified using numerical signal methods, and image computing and coding technique are used for information acquisition and carbon copy output. A subdural hematoma, which can be fatal, can develop after a serious head injury and is a gathering of blood outside the brain. Chronic or acute subdural hematomas are also possible. A really bad head injury results in an acute subdural hematoma. Less severe head injuries result in chronic hematomas. A multichannel (dipole) VHF/UHF aerial is meant for broadband wire free application areas is featured in this artide. A multichannel (dipole) antenna becomes created for operate in the occurrence band (20 MHz – three GHz). A Genetic Algorithm Optimizer (GA) is being developed to decide the positioning for charging circuits beside an aerial support. Using such an optimizer to construct an antenna maximizes the bandwidth of antenna operation. Antenna dimensions are eminent through a squat voltage standing wave ratio (VSWR) in addition to a strong gain. Aside from VSWR plus gain, supplementary dimension criteria could be assessed to guarantee optimal antenna functioning.**

Keywords*— *Imaging antenna, Wideband antenna, Microwave antenna, Dipole antenna

I. INTRODUCTION (*HEADING 1*)

Brain injuries can cause significant and enduring impacts on individuals and their overall welfare. Brain damage caused by trauma and other causes are major contributors to death and disability worldwide. Brain injuries encompass a range of types and can generally be grouped into two main categories: traumatic brain injuries (TBI) and acquired brain injuries (ABI).

Head impacts and violent shaking can lead to concussions.When there is localized bleeding or bruises within the brain tissue, typically caused by a direct blow to the head, a contusion is considered to have occurred.When a sudden acceleration or deceleration force, such as that experienced in a severe automobile accident, results in diffuse axonal injury (DAI), the brain's white matter is damaged. These are particular examples of Traumatic Brain Injuries (TBI). Examples of Acquired Brain Injuries (ABI) encompass strokes, which transpire when the blood flow to the brain is obstructed by a blood clot (ischemic stroke) or a blood vessel ruptures, resulting in brain bleeding (hemorrhagic stroke). Anoxic Brain Injury represents another form, marked by brain damage and cell demise due to a lack of oxygen. Brain tumors may originate within the brain, giving rise to localized damage and impairments in brain function. Additionally, infections like encephalitis (brain inflammation) or meningitis (inflammation of the membranes surrounding the brain and spinal cord) can induce brain damage and exhibit diverse neurological symptoms.

Intracranial hemorrhage (ICH), the most prevalent type of brain injury, is the name for the collection of blood internal to the human head. It occurs during a blood vessel in sudden breaks or ripples caused by body trauma, hemodynamic damage and other venous parasites and failures. When there is limited blood flow, the brain cannot perform efficiently because it cannot receive the necessary oxygen and nutrients from the blood. As a consequence brain cells initiate to deterioration. At the beginning of a brain trauma, millions of brain cells pass on in each second. The mastery connections between different physiological organs are impacted, which results in forgetfulness, speech loss, paralysis, and can be deadly. [1-3].

A thrombus, on the other hand, increases IC deflate, which shrink neighboring tissues and causes lasting head injury. This is anticipated a certain ICH, which encompasses intraparenchymal, intraventricular, subdural, and extradural

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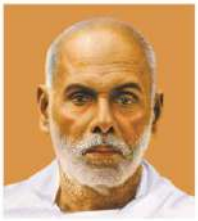

ACADEMIC YEAR

2022-2023

Emotion Recognition Methods: A Review

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***Abstract*—Emotions play a significant impact in human psychology and physiology. It stems from their daily experiences, the people they contact with, and the environment in which they live. Emotion detection has gotten a lot of attention in today's technology world since it can help with human-machine connection and complete automation. People with social interaction, communication, and developmental difficulties may benefit from emotion identification based on physiological cues. The utilisation of signals like electroencephalogram (EEG), electrocardiogram (ECG), and others has sparked interest in affective computing applications in recent years. The procedure is divided into two stages learning ECG representations and learning how to classify them. In this research different methods for emotion recognition are done.**

***Index Terms*—Convolutional Neural Network, ECG, Emotion Recognition, Support Vector Machines, Physiological signals**

I. Introduction

Emotion recognition via physiological signals [6] emerged as a hotspot and developing trend in fields of affective computing and human-computer interface. Different types of emotions are shown in figure 1. Jiangsu University identified emotions in many people using physiological signals, indicating the potential of user-independent emotion identification utilising ECG signals. The following are the four main steps in the ECG-based emotion recognition process: Affective data collection [1], feature extraction, feature subset selection [1,6] and Classifier construction If emotions have an impact on the ECG signal, changes in the P-QRS-T wave will be reflected. As a result, the specific location of the P-QRS-T wave is used to extract features. Many studies[3] have proven that using facial expressions from photos and videos, it is feasible to discern human emotions. Aside from object recognition and classification, deep learning improvements have made it possible to train massive neural networks on massive datasets for emotional computing research. In compared to the amount of deep-learning research that has been employed to solve problems, there has been a dearth of study involving images/videos on bio-sensing data.

Fully-supervised learning approaches [4] are used by the bulk of machine learning or deep learning systems for ECG-based emotion identification. There are a number of drawbacks to this method. To begin with, in a fully-supervised learning setup, for each classification or regression task the model must be trained. Furthermore, the learnt representations from fully supervised models that have been trained are frequently task-specific and are unlikely to generalise effectively to other tasks. Finally, because small datasets can lead to poor performance, fully supervised learning necessitates big human-annotated datasets. We use a deep learning strategy based on self-supervised representation [1] learning to address these issues in the context of ECG-based emotional computing, which was inspired by the success of multi-task self-supervised learning in other areas. Self-supervised learning models are taught using automatically produced labels rather than human-annotated labels. For starters, because this strategy prioritises learning generalised characteristics over task-specific ones, the representations learnt using this method are usually insensitive to inter- and intra-instance fluctuations. As a result, these models can be reused. This characteristic enhances network performance while reducing computation time by not training a model from scratch for each task. It does not require human-annotated labels, allowing for the training of deeper and more complex networks.

Fig. 1. Different human emotions.

We present an overview of several methods for emotion recognition using physiological signals in the next sections, as well as a description of the datasets utilised in this study, information about emotion recognition, and specifics of the experimental outcomes.

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AN EXPLORATION ON PLANT DISEASE DETECTION

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***Abstract* - Plant diseases cause significant losses in agricultural productivity, economics, quality, and quantity. To avoid such diseases, plants must be observed from the beginning of their life cycle. Human eye observation is the most common method for this monitoring, but it is time-consuming and demands a high level of competence. As a result, in order to make this operation easier, the disease detection system must be automated. Image processing techniques are used to construct the disease detection system. Many researchers have designed systems depending on multiple image processing approaches. This research examines the possibility of methodologies for detecting plant disease detection systems that contribute in agricultural improvement. It consists of several processes,such as image acquisition, image segmentation, feature extraction, and classification**

Keywords— Image processing, Detection, Identification of plant leaf diseases, feature extraction

I. INTRODUCTION

Agriculture is the backbone of every economy on the planet. Crop production is one of the most important variables influencing domestic market conditions in every country. [1]Agriculture has been a part of everyone's life, either directly or indirectly.It is the method of crop production that results in the provision of food, which is the foundation of every human being. Whether a person lives in a city or a countryside, everyone relies on agricultural production in some manner. With the emergence of civilization, mankind began producing crops such as wheat, cotton, and others. Crop production involves monitoring all operations to maximise output across all seasons. It involves a thorough examination of the soil, the seeds used, the key nutritional requirements of the crop, and several other factors. Yields from crops and other sources are being used to fulfil the everyday demands of not only farmers, but also others. However, as with any industry, agriculture or crop production has significant challenges in the form of crop diseases. [2]With such a high demand for food all around the world, crop production must be prioritised. Its goal is to preserve the total yield without loss before it reaches the market. Apart from natural disasters such as draughts and earthquakes, diseases are also responsible for significant crop output losses.

Crop diseases are mostly caused by infections such insect pests, bacteria, fungi, and viruses.[3]These diseases were identified and have the potential to spread throughout the plant, such as the stem, vegetables, and fruits, and can be discovered by recognizing the afflicted region,obtaining the contaminated area's feature set, diagnosing and categorising diseases.

The purpose of this research is to assess and analyse several plant disease detection methods in terms of various factors. Several studies have been conducted in the literature for leaf diagnosis as well. The image is collected, preprocessed, and noise-free during the disease detection procedure.The image is then segmented, then feature extraction and classification are performed. Plant diseases are distinguished by the colour, texture, or structure of their leaves. This technique is primarily concerned with pixel numbering schemes based on RGB properties. Genetic algorithms, K-means, HSV, ANN, CCM, RBE, Neutral networks, and other studies have been published in peer-reviewed journals. The afflicted region's parameters are identified, disease leaves are discovered, the affected area is quantified, and so on. The detection and diagnosis of leaf diseases is made more efficient by applying computer-based digital image analysis, which has a better capability. The following paper provides a quick overview of image processing techniques

II. LITERATURE SURVEY

Sachin D. Khirade et al [4] describes plant disease diagnosis is crucial for lowering agricultural productivity and quantity losses.It is necessary a significant amount of labour, in addition expertise in plant diseases and an extended responsetime.Image processing is employed in plant disease detection.Image segmentation,image acquisition,image preprocessing,feature extraction,classification are all processes in the disease detection process. Several approaches for segmenting the plant's disease area were explored in this study. The precise detection and categorization of plant diseases is crucial for crop production performance, and image processing can help with this.Extracting the properties of diseased leaves and to categorise plant diseases, feature extraction and classification techniques are applied. The application of ANN approaches, such as self-organizing feature maps, back propagation algorithms, SVMs, and others, for disease classification in plants.Using image processing tools, we can accurately detect and categorise a wide range of plant diseases.

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Classification of Fruits and Vegetables using Machine and Deep Learning Approach

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***Abstract*— One of the crucial sectors of Indian livelihood is agriculture. The development and stability of the country have been vastly backed by the farming sector. Thus, ultramodern inventions and technologies can support the testing of new approaches and practices in the farming sector. Artificial intelligence (AI) is one of the most important, useful, and current technologies. Due to its capacity to acquire dependable interpretations from images, Deep learning (DL) in particular has numerous uses. The most common DL architecture for image categorization is Convolutional Neural Networks (CNN). Classifying fruits and vegetables using deep learning is the main emphasis of this work. The model is also compared to some ML classifiers like Support Vector Machine (SVM), K Nearest Neighbor (KNN), and Decision Tree (DT) whereas ResNet the Pretrained Model, Convolutional Neural Network (CNN), and Multilayer Perceptron (MLP) in deep literacy. It was derived that SVM and MLP both showed an accuracy of97.36 on the fruit dataset.**

Keywords*— *Convolutional Neural Networks, Deep Learning, Classification, Multilayer Perceptron Model

I. INTRODUCTION

India is a country of townlets. Agriculture is one of the important factors for a nation. Agriculture provides profitable stability and profitable growth to the country. In India, the livelihood of the many people depends on farming. Fruits and vegetables are the major polish in India. According to statistics, fruits and vegetables were reported for over 3.7 trillion Indian rupees in the Indian livelihood in the time 2018. This area contributed about 28 percent to the GVA of crops at the same time, a growth from 24 percent in the time 2012. Fruits and vegetables were the main contributors to crops [1].

Sorting of fruits and vegetables is one of the crucial challenges in the agrarian field. Lot of money, time and also needs further manpower [2]. Time is one of the factors which affects cataloguing. The fruits or vegetables may get putrefied when kept for long, thus, an automated system to classify fruits and vegetables is needed [3]. With the help of AI, Machine Learning (ML), and Deep Learning (DL), this study has tried developing an automatic fruit sorting system with an information dataset of each fruit.

II. METHODOLOGY

Available different algorithms are used to break the fruit/ veg sorting problem. First, a dataset is presented, also different ML and DL algorithms are used.

Methodologies followed to classify fruits and vegetables

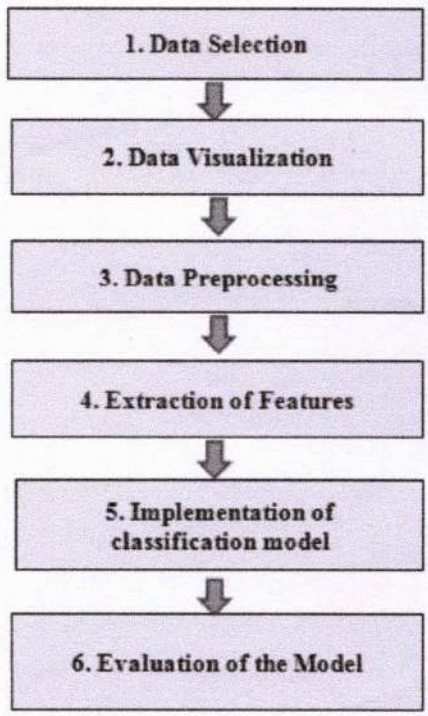

Fig. 1. Workflow Diagram

A. Data Source

Data is a pivotal element in DL. thus, it's essential to choose the applicable input data agreeing to the objects. For fruit/ veg bracket, we've used a dataset called Fruits360. The dataset includes 90483 different fruit images of 131 orders. Filename format: imageindex100.jpg (e.g.32100.jpg) or rimageindex100.jpg. Colorful types of the same fruit (Banana for illustration) are collected and fitted into separate classes.

B. Data Visualization

The patterns in the data can be identified by data visualization. Some performed EDA are

- Sample images on the dataset (Figure 2)
- Data information
- Fruit/ Veg and it's counts.
- Count plot for finding number of samples in each of training dataset class.

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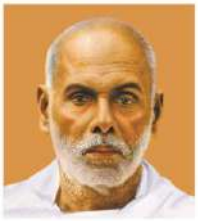

ACADEMIC YEAR

2021-2022

2021 - 22

Wideband Microwave Head Imaging System to Detect Subdural Hematoma Brain Injury

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Abstract. An antenna is one of the essential components for all wireless communication. In medical diagnosis and treatment as an academic discipline, Biomedical engineering holds a conspicuous place. For transmitting and receiving power in the human body antenna plays an implanted role. In microwave head imaging system, we use an antenna array to emit a small amount of electromagnetic (EM) energy towards the head; the dispersed EM signals are processed to image the human head inside. Based on the received electrical properties of regular and irregular tissues of the human head the image is reconstructed. In microwave head imaging, backscattered signals are captured using an antenna, the target is located by digital signal processing, for data collection and image output image computation and software engineering is used. By severe head injury a collection of blood outside the brain may occur and is called subdural hematoma, which can be life-threatening. Subdural hematoma is either acute or chronic. An acute subdural hematoma is caused by a severe head injury. A chronic subdural hematoma is caused by a less head injury. This work presents a VHF/UHF dipole antenna for broadband wireless communication applications. A dipole antenna was designed, to work in the range of frequency (20 MHz – 3 GHz). A genetic algorithm (GA) optimizer will be used to determine the location of load circuits alongside an antenna arm. To configure antenna the bandwidth of antenna operation is maximized by using such an optimizer. The configuration of antenna measurements are characterized by a low voltage standing wave ratio (VSWR) and high gain. Other measurement characteristics can also be evaluated to ensure the ideal antenna operation beyond VSWR and gain.

Keywords: Antenna, Imaging, Wideband, Microwave, Dipole antenna.

INTRODUCTION

A foremost reason of disability and mortality in the globe is Traumatic and non-traumatic brain damage. There are different types of brain damages including traumatic and acquired brain damages, inner occurrences like stroke and cancers, by an exterior heaviest impact traumatically injure the brain, such as in vehicle accidents, and some other planned and unplanned fatalities. The gathering of blood inside human head is termed as Intracranial hemorrhage (ICH), is the common form of brain damage. It occurs when a blood vessel inside the IC breaks or is sharply wavering because of hypertensive damage, corporeal shock, and other vein contagions and failures. When blood transports required oxygen and nutrition to brain, inadequacy of suitable blood flow stops the proper brain function. As consequence brain cells begin failing. Lakhs of brain's cells decease every minute, at the starting of the brain injury, which damages the control associates with diverse body parts which can cause in a lapse of recollection, discourse, and movement, and can prime to demise [1-3].

At the similar period blood bulge raises the IC compression which compresses the neighboring tissues and triggering everlasting brain destruction. It is assessed that ICH (which incorporates intra-parenchymal, subarachnoid,

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2021-22

Mechanical Property and Microstructure Analysis of Laser Beam Welded Aluminium (A6061)-Titanium (Ti6Al4V) Dissimilar Sheet Metals

Sudhin Chandran, R. Rajesh, and M. Dev Anand

Abstract Developing vogue in engineering, such as lightweighting, expanded execution, and usefulness builds the utilization of complex material, crossover fabric, and in this way, the requirement for fastening different metals. Al and Ti compounds are generally utilized in the aviation and automobile industry because of their appealing properties, like small density, intense conductivity, superior strength, and solidness. Nonetheless, the fastening of Al and Ti combinations by conventional welding techniques is troublesome because of the development of bulk intermetallic mixes. Laser beam welding is efficient for titanium–aluminium welding, a bigger pretence in aviation, automobile, electronics, and different sectors. In this research, distinct 2 mm thickness A6061 and Ti6Al4V butt seams were created by moving a laser supply on the Ti sheet's top side. Titanium alloy Ti6Al4V and aluminium amalgam 6061 were effectively joined by laser beam welding. The mechanical and microstructural qualities of the welded joints were assessed. The weld piece displays a blend of fine recrystallized particles of the aluminium compound and titanium compound.

Keywords Laser beam welding · Titanium · Aluminium · Mechanical properties · Microstructure

1 Introduction

Developing production fields like aviation, automobile, and power generation calls for particular items by integrating lightweight and recyclability characteristics. As original material frequently flops to handle those necessities, a blend of at least two materials can fulfill a particular manufacturing sector requirement [1, 2]. Divergent joints can give application-oriented solutions. Specifically, Al–Ti lightweight

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Text Based Smart Answering System in Agriculture using RNN

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Abstract

Agriculture is an important aspect of India's economy, and the country currently has one of the highest rates of farm producers in the world. Farmers need hand holding with support of technology. A chatbot is a tool or assistant that you may communicate with via instant messages. The goal of this project is to create a Chatbot that uses Natural Language Processing with a Deep Learning model. In this project we have tried implementing Multi-Layer Perceptron model and Recurrent Neural Network models on the dataset. The accuracy given by RNN was 97.83%.

1 Introduction

Agriculture contributes around 16 percent of India's GDP and employs about 52 percent of the country's population, making it a significant part of the country's economic growth. According to the Farmers' Portal, agriculture's rapid expansion is necessary not just for self-sufficiency but also for earning vital foreign exchange. One of the reasons for this is that individuals in the farming industry are relatively sluggish to accept emerging innovations. Field officers have traditionally visited farmlands to give training, guidance, and assistance to farmers. The data demonstrates that mobile connection is increasing at an exponential rate, which helps IT services promote agricultural information. The government is having difficulty disseminating important agricultural information. Furthermore, the difficulties are exacerbated by the dissemination of disinformation. These issues exist as a result of the huge linguistic variety and the rural population's lack of trust in contemporary technologies. In such a situation, using mobile devices to disseminate agricultural information looks to be a viable option [1] (K., 2020). Chat-Bot systems are a type of natural language processing that demands the system to be taught in human language in order to meet the user's demands. Agriculture is the most important sector for a country's development. Farmers are now unaware of the most modern technology and methods employed in agriculture. The challenge of extracting meaningful answers using machine learning techniques has been researched by numerous machine learning specialists, and sophisticated machine learning approaches have been created. These methods are used to obtain the correct answer. We may name this an Agriculture Question Answering System, since the farmer can ask the system a question, and the system will answer (Heller et al., 2005; Beaudry et al., 2019; Sutoyo et al., 2019). With the advancement of technology, farmers must study and address the challenges. As a result, the goal is to create a chatbot system that delivers accurate responses to queries. According to a major study in the field of chatbot systems, there is no agriculture-specific system that can provide precise and rapid answers to farmers' questions. To solve this issue, the suggested system uses the RNN (Recurrent Neural Network) deep learning method to offer accurate responses to the queries asked.

[1]https://en.wikipedia.org/wiki/Agriculture_in_India/

2 Problem Statement

The traceability software from Source Trace gives you complete visibility into the agricultural value chain. It has an influence on farmers' lifestyles, helps an organization adopt data-driven agriculture, and fosters trust and improved interaction with stakeholders. Agriculture employed half of India's workforce and provided 17–18% of the country's GDP. Agriculture and related industries such as animal husbandry, forestry, and fisheries accounted for 15.4% of GDP in 2016 and employed around 31% of the workforce in 2014. The

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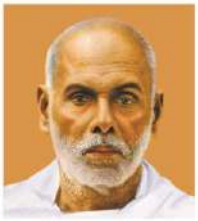

ACADEMIC YEAR

2020-2021

Robust Video Watermarking Resilient To Inadvertent Attacks

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***Abstract*—The security of information contents exists as a problem for researchers about various techniques discussed in the reviews for protecting digital rights and copyright authentication. The method for providing secureness to right-owners is digital watermarking; i. e, the method of embedding secret text message in the file. The availability of online contents of audio clip, images and videos are rapidly growing. The efficiency of watermarking algorithm mainly follows on the properties of robust and also imperceptibility .**

Modern watermarking methods are capable of successfully attacking older watermarking methods. That arises the importance of designing recent and robust watermarking methods for resisting the attacks of watermarked videos. We developed in this project, relating new video watermarking technique based on combination of Discrete Wavelet Transform(DWT) and Singular Value Decomposition (SVD). To understand the robustness of watermarking algorithm, the watermarked video is subjected to inadvertent attacks. Performance analysis were done using evaluation metrics like NCC, PSNR and BER. The lower entropy frames are used for text watermark embedding. Compared the performance with existing methods in presence and absence of unintentional attacks like cropping, blurring, and adding noises like salt and pepper noise, speckle noise.

***Index Terms*—Digital Rights Management, watermarking, attacks, DWT, entropy, NCC, PSNR.**

I. Introduction

Due to the popularity of techniques by Digital Rights Management, the capabilities like re-modifying, adding contents, and re-transmission of original data in absence of consent of the right holder are developed . The watermarking technique is sophisticated technology to prevent the usage and establish resilient software activates the owner to focus inexpensive and illegal modification of data to certain limit [1]. This method access permission to legal user for viewing the file.

Digital watermarking are process of inserting text messages into an original data like picture, voice and video), such that that modification of files are not permitted to the hackers. The watermarking technique consist of embedding and extraction processes[2]. Embedding process of watermark is given as shown in form of block diagram in Figure 1.

Extracting text watermark from watermarked files are shown in Figure 2.

Watermarking techniques can be categorized depending on factors like domain (spatial or frequency domain), watermark category (text, image), application mode(Robustness and fragile), visual perception (perceptible or imperceptible) [3]. Recent watermarking methods are shown in Figure 3.

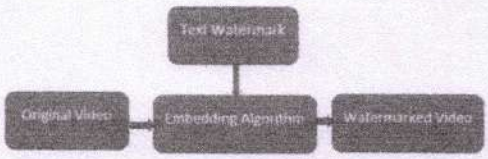

Fig. 1. Text watermark embedding in video

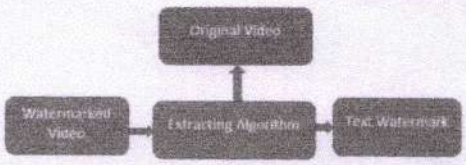

Fig. 2. Text watermark extraction from watermarked video

The literature survey reveals that spatial domain watermarking techniques are more imperceptible, low computation cost, more embedding capacity, less computational complexity and less robust to attacks. The frequency domain watermarking techniques were found to be more robust, more computational complexity and resilient to most of the attacks. The following

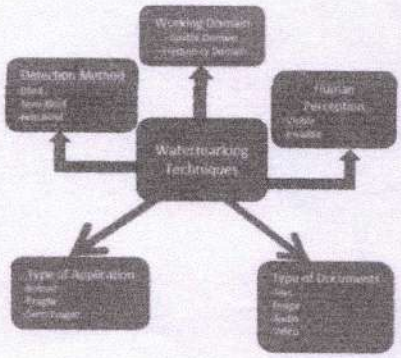

Fig. 3. Watermarking Techniques

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High Security Watermarking Techniques for Digital Rights Management: A Review

Bushra Abdulla N. T and K. A. Navas

***Abstract*—Protection of data still remains as an anxiety to the researchers in spite of large number of techniques have been proposed in the literature to protect digital rights and authentication of documents. One of the methods to provide security to the right-holders is digital watermarking; the technique of hiding secret message in the document to ensure authentication. Effectiveness of Watermarking depends on the robustness, imperceptibility and security. Presence of online data including audio, images, videos and diagrams in binary representation is fast increasing. New digitization techniques are capable of successfully attacking earlier watermarking techniques. This demands the need of developing new watermarking techniques to prevent the attacks on water-marked images. We attempted in this work to examine recently reported watermarking techniques in the literature which are claimed to be meritorious by the authors In this paper we discuss the merits and inefficiencies of the recently reported techniques which claim many merits. Identification of the room for research will be helpful to the researches to attempt on the development of new techniques.**

***Index Terms*—Image processing, watermarking, attacks, digital rights management, copyright.**

I. Introduction

DIGITAL Rights Management includes development of techniques to prevent the reprocessing, editing, and transmission of original criteria without permission of the owner. Accessing and replicating restriction software enables the owner to review on costless and illegal editing of content to certain extent [1]. These techniques give permission for paid users to access the product.

Digital watermarking technique is a method of embedding one or more signature in original content (image, audio, video, text etc.) so that accessing of data is difficult to the attacker. Reversible watermarking systems are more meaningful.

Embedding of watermark in image data is shown with help of a block diagram in Fig. 1. Extraction of watermark from the watermarked image is shown in Fig. 2.

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Watermarking techniques are classified in regarding factors like types of domain (spatial domain or transform domain), document types of watermark (text or multimedia), types of application (Robust, fragile, semi-fragile), perceptual quality (visible or imperceptible) [2]. Major watermarking techniques are depicted in Fig. 3.

Fig. 1. Embedding of watermark in image.

Fig. 2. Extraction of watermark from watermarked image.

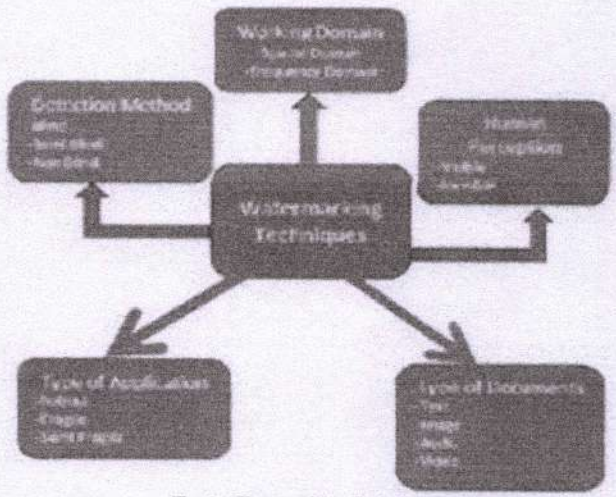

Fig. 3. Watermarking Techniques.

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Analysis of mechanical properties and optimization of laser beam welding parameters on dissimilar metal titanium (Ti6Al4V) and aluminium (A6061) by factorial and ANOVA techniques

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ABSTRACT

The Laser Beam Welding (LBW) is done among the two different materials titanium (Ti6Al4V) and aluminium 6061. The welding is done toward twenty-seven samples to improve and approve the mechanical and metallurgical properties. This welding is completed through three sets of process parameters and three sets of values. The mechanical properties like hardness and tensile strength are estimated for the workpiece, and the ultimate value is said to 290 HV and 205 MPa, separately. The factorial structure of the examination quantifies the reaction of each conceivable blend of factors and factor levels. ANOVA technique is used to advance the procedure boundaries to achieve the ideal joint quality and nature of joints in the welded tests. Likewise, it is utilized to distinguish the utmost prevailing process parameter in this welding procedure. The three process parameters with three sets of values are welding power (1600–2000 W), welding speed (2–2.4 m/min), and offset (0.2–0.4 mm). It is evident from the SEM micrographs demonstrated that there is no fastening imperfection in the interface.

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1. Introduction

The utilization of lightweight structures is developing altogether in several manufacturing divisions like aviation, defence, and automotive industries demand great solidarity to weight proportion is accomplished in the fastening procedure among titanium and aluminium amalgams. The investigation has been done in these divisions in creating different welding strategies to deliver prominent strength and minimal weight parts. The thermal welding of Ti/Al unique composites is a confront on account of considerable distinctions in physical–chemical properties among Ti and Al [1–3].

Be that as it may, the utilization of lightweight materials becomes challenging when two various types should be incorporated and associated. The association of different materials like Al (A6061) and Ti (Ti6Al4V) can be acknowledged by riveting, press-joining, and screwing. These are as yet generally utilized methods in the automobile and aviation businesses. An option for fastening titanium and aluminium is the utilization of laser frameworks like Nd: YAG or CO2 to acknowledge welds with superb properties. Be that as it may, the fundamental viewpoint during the fastening of aluminium to titanium is the development of intermetallic stages, which rely upon process associated temperature–time cycles. The butt joint procedure utilizes a brazing procedure in blend with a welding procedure to understand an association between unique materials. The laser should be situated in the titanium-aluminium process, ideally on the titanium sheet [4,5].

In this examination, the two unique materials, for example, titanium (Ti6Al4V) and aluminium 6061, have been welded through the Laser beam welding process. Altogether, twenty-seven samples are set up according to the detail for this welding procedure. The mechanical properties like hardness value and tensile strength are estimated for all the welded specimens to assess the ideal seam quality and nature of the weld seams. In this LBW procedure, three process parameters have taken, for example, Laser power (W), welding speed (m/min), and offset (mm). Three levels of values have been given during the procedure. Factorial (DOE) strategy is utilized to recognize conceivable factors and factor levels. ANOVA is utilized to look at the most affecting process parameter in acquiring the highest tensile and hardness value and get the whole

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Multi-response optimization of process parameters for laser beam welding of AA6061-Ti6Al4V by grey relational analysis

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Factorial method
ANOVA

ABSTRACT

Laser beam welding (LBW) is employed for consolidating distinct materials, aluminium (AA6061) and titanium (Ti6Al4V). LBW, attributable to appealing highlights, to be specific, low heat input, high heat focus, high-power density, and low contortion, is a more useful technique for welding and fixing airplane and turbine motor components built from superalloy. This investigation concentrates on optimizing process parameters for laser beam welding of AA6061-Ti6Al4V utilizing factorial-based grey relational analysis. The welding input parameters assume a fundamental part in optimized preferred weld quality. The input parameter picked were laser power, welding speed, and offset. The welding is done for 27 specimens to elevate and endorse the mechanical and metallurgical properties. This welding is completed with three sets of process parameters with three levels of values. The three-process parameter with three sets of values are welding power (1600–2000 W), welding speed (2–2.4 m/min), and offset (0.2–0.4 mm). ANOVA technique was utilized to evaluate the centrality of variables on the finest quality of the weldment. ANOVA results demonstrated that laser power assumed a significant part of the quality targets (Tensile strength and hardness) of the weldments trailed by welding speed and offset. Grey relational analysis is implemented to optimize the input parameters at the same time considering multiple output variables.

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1. Introduction

The welding of dissimilar metals is joining at least two metals that can be attempted at specific requirements. It is hard to unite distinct materials due to their disparities in chemical configuration, physical and chemical properties [1]. The hard and fragile intermetallic mixes of Al alloy and Ti composite can be developed at a welding interface utilizing a regular welding process [2]. Laser beam welding (LBW) is a striking technique for consolidating unique materials due to its low, confined energy input prompting low distortion, high strength of the joint, and high processing speeds [3].

Aluminium composites have lower density and lower cost, and titanium alloys could recommend a favourable position compared to ordinary materials because of their high strength, stiffness, and corrosion resistance. Crossbreed frames of aluminium and titanium combination materials have been generally utilized. With light-weight construction strategies and monetarily accessible and suitable materials, they can accomplish the appropriate balance between execution and cost [4]. For instance, it is notable that the cooling fin utilized in airplane cabins comprises an aluminium blade and a titanium pipe. The honeycomb frame of the plane's wings is frequently a composite structure in which a titanium skin is linked to an aluminium honeycomb. The benefit of uniting different materials is a lower weight, high solidarity to-weight proportion, high fatigue resistance, and higher anti-vibration limitation and solidness that can be acquired [2,3,5]. Crossbreed structures and segments built of aluminium and titanium metals have been utilized in aerospace applications, particularly airplanes. The trial NASA YF-12 fighter wings were comprised of a honeycomb composite plate of Al/Ti. The plane will highlight titanium plates and a composite structure of aluminium ribs in the airplane seat rails and in zones especially subject to corrosion to increase the corrosion resistance, decrease the weight, and diminish the assembling expenses [2,6].

In this examination, the two materials, titanium (Ti6Al4V) and aluminium (A6061), have been welded through the Laser beam

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Impact of Heat Treatment on Laser Beam Welded Aluminium (A6061)-Titanium (Ti6al4v) Dissimilar Sheet Metals

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Abstract. Manufacturers request innovative materials to connect their need for that better innovation is adopted to discover a solution through research. One such exertion is laser beam welding to fasten the Ti/Al compound for the aviation and different purposes. It is as yet a test to fabricate an agreeable bond among these distinct composites. This article exhibits the impacts of the post welding heat treatments (PWHT) on the mechanical properties and microstructure development of Ti6Al4V and A6061 different laser welds. The welded joints exposed to two heat treatment processes (550^0 C * 15 min quenching, 550^0 C * 15 min quenching + 200^0 C * 15 min aging), and the outcomes compared with weld joints before PWHT. Test outcomes show that age heat treatment promotes strength for the fabric over 29%, and laser welding is reasonable for distinct alloy joining.

Keywords: Laser beam welding (LBW), post-weld heat treatment (PWHT), mechanical properties, microstructure

INTRODUCTION

During the most recent years, due to natural and financial prerequisites, the manufacturers are mentioned to develop new innovative arrangements and tweaked materials to advance cost decrease and protection of assets. Multi materials complex assemblies consolidate the fundamental points of interest of every part helpfully into an advanced material, fit for working in different conditions, saving misuse of material, and decreasing the heaviness of the entire structure [1][2]. Manufacturers, for example, aviation, automotive, power generation, and clinical call for superior items, consolidate an expanded number of direction and properties like lightweight, adaptability, recyclability, and warrant productivity. As single material frequently fails to link up those necessities, a blend of at least two materials can fulfil a particular requirement for those businesses [3].

Specifically, Al-Ti lightweight compound fabric has a broad scope of uses and potential possibilities in aviation, airplane, and automobile businesses, for which a decrease of weight and fuel utilization speaks to a fundamental requirement [1][4]. Titanium combinations, as Ti6Al4V, are in expanding interest for aviation applications because of their high explicit quality, erosion obstruction, harm resilience, and compatibility with graphite fiber composite materials [5]. The mix of an Al-composite with Ti6Al4V for airplane seat tracks, appeared in Figure 1, is such use while decreasing weight (Aluminium) and refine quality and erosion obstruction (Ti) [6].

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Design of gas cleaning unit for biomass gasifier

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Abstract. Biomass is considered as renewable energy and its energy potential is promising due to the reason that biomass is a more evenly dispersed source over the earth and thus available nearly worldwide. The challenge is to remove the biomass-derived contaminants such as tar, particulates, H_2S and HCl, alkali compounds from the product gas, and then use it for other applications. The objective is to design a proposed gas cleaning unit using ANSYS for the downdraft biomass gasifier and thereby remove the contaminants. From the simulation it was concluded that, the outlet temperature of the downdraft gasifier found from the simulation is 1285.7 K. From the simulation of the proposed cleaning unit, the outlet temperature of 1264.6 K is formed.

1. Introduction

With the continuously increasing demand for energy, our current primary energy source, fossil fuels are getting depleted, which are used to support economic growth. The gasification process can be used as a backup plan for the production of electricity; but is necessary to remove impurities produced such as particulates, sulphur oxides, CO_2, and others. Alessandro Vulpio et. al [2] discussed mainly the 2D ANSYS simulation of the downdraft gasifier using the wooden pellets. This journal has been used for the validation of the simulation that has been modelled in this report. Here the gasification of the wooden pellets has been done and these results have been used for the validation purpose. Here a test case taken from literature has been simulated with an alternative set of reactions. George Yaw Obeng et. al [3] discuses mainly about the gasification process with the help of the coconut husks. The results indicate that 62–65% of the whole coconut fruit can be generated as wastes in the form of husks and shells. It also found out that as the water evaporated gradually from the raw un-charred coconut wastes during the combustion process, charred coconut wastes would likely produce less CO pollutant emissions than the raw un-charred coconut wastes.

2. Geometric modelling of biomass gasifier and cleaning unit.

The geometric modelling of the downdraft gasifier is made in the ANSYS. The schematic diagram of the downdraft gasifier system is shown in Figure 1. The dimensions of the system are 481mm in height and 178mm in diameter to do the simulation. The proposed geometric model is also designed and modelled in ANSYS. The length of the model is 101mm. it has a width of 8mm. It has a negligible thickness. The simulation work is done in 3D.

The cleaning unit consists of 3 main parts. First is the outer sheet of the metal cover. The metal sheet cover is made of stainless steel. The next part is ceramic wool. It is inside the metal cover. The final part is the perforated tube which is also made of steel. The hot air from the gasifier is made to pass through the gas cleaning unit. Shown below is the schematic diagram of the proposed cleaning unit (Figure 2). Grid independence study is performed to eliminate/reduce the influence of the number of grids/grid size on the computational results. If any changes in geometry, meshing grids definitely

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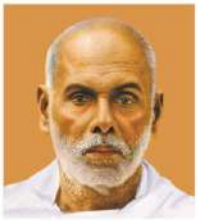

ACADEMIC YEAR

2019-2020

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Fuzzy & PI Controller Based Energy Management Strategy of Battery/ Ultracapacitor For Electric Vehicle

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***Abstract*— Electric vehicles have gained more attraction throughout the world due to its advantage of green technology and decreased emission. . Moreover, they are being powered by battery would be the best option of replacing current petrol or gas dependent vehicles. There are some drawbacks associated with battery; it has limited lifetime and cost is very high. Hence, it is hybridized with other energy storage systems such as Ultracapacitor/Supercapacitor. This work uses a fuzzy and Pi control for Energy management system for Electric Vehicle and Simulation environment chosen is Matlab/Simulink.**

Keywords*—*Ultracapacitor-Fuzzy controller-Energy Management system-Unidirectional and Bidirectional Converter-Battery

I.INTRODUCTION

In recent years, global warming and other climate change issues are raised many problems in many developed countries. So we have to decrease fuel consumption. Particularly focusing on vehicle technology to reduce the effect of global warming and other energy issues we have to adopt new technologies. Few well-known technologies are hybrid electric vehicles (HEV) and full electric vehicle (FEV). Other researchers are working to improve the fuel efficient transport technology which provides internal combustion engines with power supply, power recovery systems, and ultracapacitors. One of the key issues regarding the design of electric vehicle is requirement of an energy management strategy. Primary aim of this work is to design a fuzzy and PI controller based energy management for electric vehicle.

Deceleration of a vehicle with a traditional braking system will convert kinetic and potential energy of the vehicle into thermal energy or heat through the action of friction. With regenerative braking in electric vehicles, this kinetic energy can be converted back into electrical energy that can be stored in ultracapacitor for reuse to propel the vehicle during the driving cycle.

II.ELECTRIC VEHICLE CONFIGURATION

The Electric Vehicle allows electric motor (EM) to deliver power to drive the wheels. Electric vehicles are vehicles whose wheels are turned by electric motors rather than by a gasoline-powered drivetrain. EVs have been long touted as saviors of the environment due to their apparently zero emissions of pollutants, but have been also been criticized as limited in range and of less environmental benefit than claimed. It mainly consist of electric motor which is driven from a battery energy storage system which is assisted by an ultracapacitor.

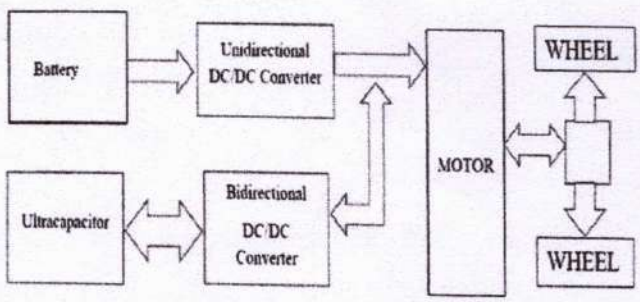

Fig.1 Electric Vehicle Configuration

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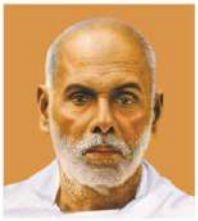

ACADEMIC YEAR

2018-2019

Wavelet Modulated Inverter for WECS using Permanent Magnet Synchronous Generator

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Abstract— **In this paper, a better control techniques known as wavelet modulation is proposed at the inverter side of wind energy conversion system. Permanent magnet synchronous generator is one of the generator used for integration of wind energy into power electronic topologies due to its simple construction & it provide direct coupling & number of poles can be change easily. A back to back converter topology is the most commonly used one, consist of rectifier on rotor side and inverter on grid side. Several modulation techniques are there for the control of inverter connected to load side in a wind energy conversion system. Switching pulses for inverter is generated using dSPACE1104 controller. The overall system is modelled and performance is verified in MATLAB Simulink & in hardware and obtained Low harmonic content and magnitude of fundamental component is high as compared to conventional techniques.**

Keywords—Wind energy conversion system (WECS), Total harmonic distortion (THD), Wavelet modulation (WM).

I. INTRODUCTION

As the wind power generation has been increasing day by day, it is important to design and select proper generator and converters for WECS. Various types of generators and power electronic topologies are used for integration of wind energy to grid or isolated load. Squirrel cage induction generator is a simple, small size, low cost machine having stable performance, but it is a geared turbine with fixed speed [1]. In a doubly fed induction generator stator is directly connected to grid and rotor is connected to load side using rotor side converter and grid side converter. Active and reactive power can be effectively controlled using this system [2]. But it is a geared system having brush and slip rings, hence entire cost of the system and failure rate is high [3]. Permanent Magnet Synchronous Generator (PMSG) does not have brush, slip ring and gear box [4]-[5]. It is simple in structure and can be directly connected to wind turbine. Stator of generator is connected to load using rotor side converter and load side converter [6]. Better control techniques are needed to reduce harmonic distortion in the output side of inverters.

Pulse width modulation (PWM) is the most widely used techniques for the control of inverter, by increasing switching frequency, THD decreases, however this increases the switching losses [7]. Third harmonic injection technique adds third harmonic to each phase of a three phase inverter. This technique provide inverter output voltage as sinusoidal, approximately same as that of AC supply. But it does not provide any information about the amount of third harmonics to be injected [8]. Space vector modulation and selective harmonic elimination are the alternative concepts. In space vector modulation space vector concept is used for the computation of duty cycle of the switches [9]. Opposite harmonic elimination is the technique used in selective harmonic elimination [10]. Both these are very difficult to implement [11].

In this paper a new techniques, known as Wavelet Modulation scheme is applied to inverter of a WECS. . It's a sample based techniques [12]-[15]. Wavelet is like a wave that first begin to zero and reaches to maximum amplitude and decreases to zero amplitude again. The overall system is modelled and performance is verified using simulation & hardware results.

II. PROPOSED WECS WITH WAVELET MODULATED INVERTER

The proposed system consists of a wind turbine coupled to a PMSG, a diode rectifier used at the machine side and a wavelet modulated inverter used at the load side which gives a high quality voltage at the output. Fig.1 shows the circuit diagram of proposed wind energy conversion system.

A. Wavelet Modulation Scheme [12]

Wavelet modulation is a sampling based technique can be done by creating two time instants at first. These time instants are boundaries of rectangular pulses and these are interpolated into rectangular pulses in the second step. The sampling instant

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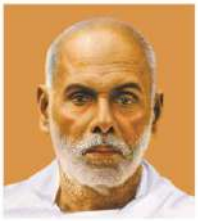

LIST OF JOURNALS

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Research Publications

Publication of Journals

Sl.No.	Title of paper	Name of the author/s	Year of publication
1	Experimental Investigation on use of cockle shell as partial coarse aggregate replacement in concrete	B.May Sonia George, Raseela M KP	**2018**
2	Analytical study of thermal behaviour of RC Beam Retrofitted with Rubberised concrete and GFRP using Ansys Workbench	Saritha Sasindran, Manju P.	**2019**
3	PI Control based energy management stratergy of battery/ultracapacitor hybrid electric vehicles	Vaishakh.M.Nayanar, Ms.Keerti.S.Nair	**2019**
4	Approaching Bus Driver Collapse Exposure Entity Situated Upon Rumbustious Observable Enquiry as Concerns Eye Eventuality	Sharija P,Akhila Mathew	**2019**
5	Experimental investigation on use of cockle shell as parial aggregate replacement in concrete	Raseela M K P, B Mary Sonia George	**2019**
6	Double -Elliptical Micro strip patch Antenna for Higher design flexibility and Miniaturization	Jerry V Jose , A Shobha Rekh,Jose MJ	**2019**
7	Double -Elliptical shaped miniaturized Microstrip patch antenna for ultra wideband applications	Jerry V Jose , A Shobha Rekh,Jose MJ	**2019**
8	Design Techniques for elliptical Micro strip patch Antenna and their effects on antenna performance	Jerry V Jose , A Shobha Rekh,Jose MJ	**2019**
9	Laser Beam Welding: Research State of the Art on Performance and Measures	Sudhin Chandran, R. Rajesh and M. Dev Anand.,	**2019**
10	A Review—Studies on Heat Treatment of Laser	Sudhin Chandran, R. Rajesh and M. Dev	**2019**

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	Beam Welded Ti/Al Dissimilar Sheet Metals	Anand.,	
11	Experimental study on the use of magnetised water in basalt fiber reinforced concrete	Shamya Sukumaran M, Silpa Valsakumar	**2020**
12	Cyclic analysis and bending performance of splice connection assembly of FRP columns in modular buildings	Anjali K V , Saritha Sasindran	**2020**
13	Alum sludge -A partial replacement to cement in concrete	Suchand B, Saritha Sasindran, Dr. Leena A V	**2020**
14	Economic Evaluation and Comparison of Green Building with Conventional Building using Carbon Footprint and Embodied Energy Calculator developed using MATLAB	Keerthana B Chandran1 Dr. Susan Abraham	**2020**
15	Seismic behaviour of multistoried building with oblique column and its height optimization	Navaneeth Krishna, Abhishek C V	**2020**
16	Numerical studies on the shear behaviour of near surface mounted RC deep beams with longitudinal hole	Shibin B, Dr. Rajesh K. N	**2020**
17	Performance and optimization of outrigger with belt truss system in multistoried building	Aswathi C , Sruthi Das K K	**2020**
18	Design and Analysis of a Typical Grid Fin for Aerospace Application	Priyanka V V, Dr. Shashi Bhushan Tiwari, Prashanthan A, B Mary Sonia George	**2020**
19	Seismic analysis of multi storey building with floating columns using ETABS	Harsha P V, Shilpa Valsakumar	**2020**
20	Study of mechanical performance of concrete with the addition of graphene oxide as admixture	khil Karunakaran , B Mary Sonia George	**2020**
21	Experimental Study on the Use of Magnetised Water in Basalt Fiber Reinforced Concrete	Shamya Sukumaran M Shilpa Valsakumar	**2020**
22	Predicting performance characterestics og double elliptical Micro-strip patch antenna for	Jerry V Jose , A Shobha	**2020**

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	radiolocation applications using response surface methodology	Rekh,Jose MJ	
23	Analysis of mechanical properties and optimization of laser beam welding parameters on dissimilar metal titanium and aluminium by factorial and ANOVA techniques	Sudhin Chandran, R. Rajesh and M. Dev Anand.,	**2020**
24	Investigation on Post-Weld Heat Treated Titanium-Aluminum Dissimilar Laser Welded Joint,	Sudhin Chandran, R. Rajesh and M. Dev Anand.,	**2020**
25	Analysis and Design of Mono Column Building	Thejus Sreehari, Mrs. Shilpa Valsakumar	**2021**
26	Cyclic Performance of Cross Slanted Corrugated Steel Plate Shear Wall with Beam Only Connected Infill Plates	Sreya Dileep N, Saritha Sasindran	**2021**
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28	Strengthening of the Deficient Steel Sections Using Hybrid Composites under Various Loading Scenarios	Shifa Ameer, Shilpa Valsakumar	**2021**
29	Structural Performance of Partially Precast Steel Reinforced Green Concrete Columns	Sanjana D Nambiar, Dr. Susan Abraham	**2021**
30	Structural Optimisation of Non-Seismically Detailed RC Beam-Column Joints using Prestressed and Prefabricated Steel Encasement	Rakhi P K, Dr. Susan Abraham	**2021**
31	Disposable Knee Bracing in Combined Bracing System- Improvement in Seismic Design of Steel Frame using ETABS	Resna K P, Mary Sonia George	**2021**
32	3D Steel Truss Bridge with GFRC Deck	Pooja K P, Saritha Sasindran	**2021**
33	Effect of Bracing Location in PEB Under	Mirshad E M, Dr. Susan	**2021**

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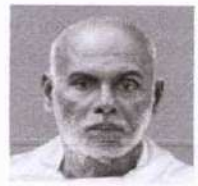

	LTERAL Loads	Abraham	
34	Seismic Resilience Evaluation of Steel Frames With Y-Shaped Braces Equipped with Cost Effective Damper	Anugraha V , B Mary Sonia George	**2021**
35	Masked face identification by ensuring safe social distancing, temperature screening and crime detection	Sharija P, Ashamol P R, Bhavya N, Adil Bin Anwar C P, Gokul Raj	**2021**
36	An adaptive tailored finite point method for the generalized Burgers' equations	V.P. Shyaman, A Sreelakshmi and Ashish Awasthi	**2021**
37	Laser Beam Welded Aluminium-Titanium Dissimilar Sheet Metals: Neural Network Based Strength and Hardness Prediction Model,	Sudhin Chandran, R. Rajesh and M. Dev Anand.,	**2021**
38	Soft storey mitigation behaviour of combined hexa, octa and penta bracing system	Sanam N G, Dr. Susan Abraham	**2021**
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41	A synopsis on intelligent face discovery frameworks	Swetha Pai,Nimisha Rajjev P, Anima M, Heera Mohan K.	**2022**
42	A interwoven composite tailored finite point method for two dimensional unsteady burgers' equation	V.P. Shyaman, A Sreelakshmi and Ashish Awasthi	**2022**
43	Pollution analysis and instream treatment for improvement of Canoli canal	Revathi P, Mohanan Namboodiri P E	**2022**
44	Structural performance of steel encased compsite multilayerd concrete beam	Nikesh K, Ms. Shamya Sukumaran M	**2022**
45	Adaptation of corrugation web in cellular beams	Athira Ramesh, Shibin B	**2022**

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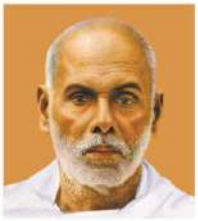

ACADEMIC YEAR

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Structural Performance of Steel Encased Composite Multilayered Concrete Beam

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Abstract- In this paper, a composite multilayered concrete beam is analyzed by using ANSYS workbench software. An I section which is partially encased with Ultra-High Performance Concrete [UHPC] and Ultra-Light weight Cement Concrete [ULCC]. These composite materials had been arranged horizontally and vertically along the I Section. Compressive strength of various multilayered composite beams has been compared. Instead of using conventional steel or reinforced concrete members, this form of beams offers greater strength and stiffness.

Keywords:- Ultra-High Performance Concrete [UHPC], Ultra-Light weight Cement Concrete[ULCC]

I. INTRODUCTION

Structural steel which is partially enclosed or fully enclosed with concrete are frequently used in building construction. Instead of using conventional steel or reinforced concrete members, this form of beam offers greater strength and stiffness. The steel section is protected from fire, the compression flange is kept from buckling locally, and the resistance of the beam to lateral-torsional buckling is increased by the concrete encasement. Where standard beams are insufficiently serviceable, composite beams are used. We can somewhat minimize the cross-sectional area of the beams by using composite ones made of greater stiffness materials. They are utilized to make the construction stronger. Large areas can be covered by composite beams without the need for an intermediary structure.

UHPC is a cementitious composite material made up of a high proportion of discontinuous internal fiber reinforcement, a water-to-cementitious materials ratio less than 0.25, and an optimized gradation of granular elements. A brand-new category of concrete called UHPC has recently been created due to its extraordinary strength and endurance. The first UHPC bridge in North America was built in Canada in 1997 as a pedestrian bridge. Compressive strength of UHPC is ten times greater than that of conventional concrete. Portland cement, fine sand, pulverised quartz, accelerating admixtures, steel fibres, and water are the main ingredients in UHPC. With low densities of less than 1400 kg/m3 and compressive strengths of up to 60 MPa, ultra-lightweight cement composites (ULCC) are the perfect choice for usage in buildings where material weight is important. In structural applications with low weight and permeability requirements, lightweight aggregate concrete (voids are primarily in aggregates) is often used in place of conventional aggregate. Lightweight concrete is especially beneficial for long-span constructions, high-rise structures, and sandwich structures that must have minimal self-weight.

II. OBJECTIVES

- To study the partially encased composite beams.
- The effect of different composite materials.
- The effect of number of layers.
- The effect of arrangement [Horizontal/ Vertical]

III. SCOPE OF THE WORK

The scope of this study is to develop a high strength multi-layered composite beam instead of using steel or conventional reinforced concrete beams.

IV. PARAMETRIC STUDY

Multiple aspects were taken into consideration when conducting the investigation on the partially encased multi-layered concrete beam. The beams measure 2000mm in length, 250mm in depth, and 200mm in breadth overall. All examples are constructed using WB 225 hot-rolled wide-flange beams. Vertical and horizontal arrangements had been made with the composite cementitious materials. A single beam included three layers of cementitious material, each with an identical layer thickness.

Code of references: Indian Standard codes IS 808(1989)

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Progressive Collapse Mitigation Study on Box Column and Steel Beam with Corrugated Web RBS

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***Abstract*:- Steel frame constructions using traditional weld connections frequently experience brittle breakdowns. To mitigate this issue,steps were taken to incorporate plastic hinges and improve the ductility of the steel connections.The beam-to-column connection has been identified as a key element for steel frame structures to maintain the structural integrity during progressive collapse phenomenon. In this study box column and steel beam subjected to progressive loading are considered with corrugated web RBS connection, called the curved cell web RBS (CW-RBS) which increases the moment capacity and the time of progressive collapse. In the case of RBS a portion of beam is being cut from the web and flanges so that plastic hinge gets relocated to the portion which is weak and this prevents welding failure at the end of beam and failure in column but this reduces the stiffness of beam. In this case CW-RBS is implemented on the beam that is web of the beam is cut in an area near the column and the cut-out section is replaced by a cell made with two curved corrugated plates,this increases the stiffness which inturn increases the moment capacity and time of progressive collapse. Thus failures on box column completely gets relocated to CW-RBS and makes the box column and joint safe thereby we can prevent this portion from weakening. These are done according to FEMA 350. Modelling and analysis is carried out using ANSYS software .In this study we obtain ultimate load capacity, moment capacity, drift angle.**

Keywords: Progressive Collapse Mitigation, RBS, CW-RBS Corrugated Web RBS

1.INTRODUCTION

Steel frame structures with ordinary weld connections often suffers from brittle fracture situation in which a local failure causes a major collapse, with the magnitude being disproportionate to the initial event. For steel frame structures, the beam-to-column connection has been identified as a crucial component for maintaining structural integrity during the progressive collapse phenomenon.

Progressive collapse refers to a situation in which a local failure causes a major collapse, with the magnitude being disproportionate to the initial event. New strategies were necessary to improve the ductility of the steel connections, such as weakening the beam section at an appropriate distance from the column face. In steel moment frames, reduced beam section (RBS) connections have been widely used, with parts of the beam flanges near the beam to column connections being removed [Fig 1].The yielding zone can be transferred from the column face to the beam span using RBS connectors, and thereby it prevents initial damage from occurring directly at the weld joints of the beams and columns.

In addition to the RBS beam approach, another strategy is to introduce openings in beam webs to form a plastic hinge away from the connections to make beams more ductile . Web-openings in beams can be used to improve the spatial efficiency of buildings and provide access to pipelines. Engineers create web openings for pipelines in steel frame structures, air-conditioning, heating, and water supply systems that require special pipelines. Connections with flange- or web-reduction may change the mechanical characteristics and increase structure deflection when large deformation occurs. It is extremely important to consider the bearing capacity, deflection, and cracking of beams with flange- and web-reductions, which can be indirectly evaluated by the ability to resist progressive collapse.

In this study box column and steel beam are considered with corrugated web RBS connection, called the curved cell web RBS (CW-RBS) which increases the moment capacity and the time of progressive collapse. Modelling and analysis is carried out using ANSYS software.

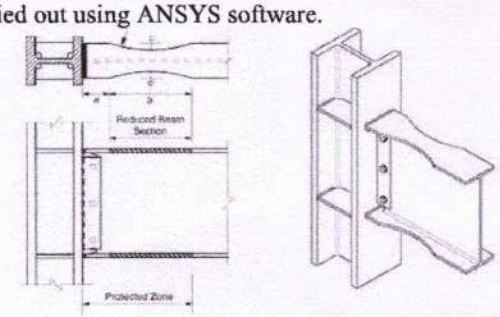

Figure 1. Reduced Beam Section (RBS)

Figure 2. Application of Reduced Beam Section (RBS) Connection

Fig 1 RBS

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Performance of Integrated Orthogonal Columns with and Without FRP Wrapping Subjected to Localized Corrosion

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Abstract- A numerical model was created with the aid of the commercial finite element programme ANSYS in order to investigate the impact of local corrosion on the ability of orthogonal concrete filled steel tube (CFST) columns to support loads under axial and eccentric loads. To fulfil the structural design requirements, a T-shaped column is utilised. Construction of bridges frequently makes use of it. Non-symmetrical columns include those in the L and T shapes. The likelihood of corrosion is considerable if a column is damaged since they are not symmetrical. All of the columns' faces and corners are examined for corrosion effects. Analogously, determining how the damage manifests itself in the column when corrosion is at the middle. A decrease in the load-bearing capability of an orthogonal CFST column was demonstrated with the same corrosion rate. Look into how the CFST column will ultimately behave under corrosion and coupled sustained load. The structure can be strengthened by layering a carbon fibre reinforced polymer (CFRP) system around it. The test's findings indicate that using CFRP boosts a column's ability to support loads.

Keywords-CFST, L- shaped column, T- shaped column, Localized corrosion, ANSYS software, CFRP.

I. INTRODUCTION

The concrete filled steel tubular (CFST) structure has advantages of high bearing capacity, good plasticity and toughness, convenient construction and high economic benefit. It is widely used in high-rise buildings, long-span highways, high-speed railway bridges, offshore platforms, boiler towers, TV stations and other civil engineering structures. At the same time, the CFST column in service is exposed to environment, which induces different corrosion damage. Corrosion could weak the cross-sectional area of steel tube and steel mechanical properties; Pit corrosion could also penetrate steel tube walls, allowing harmful corrosive media to penetrate into concrete, and further causing concrete damage. These lead to structural resistance degradation over time, affecting the safety, durability and applicability of in-service structure, and even trigger engineering accidents in serious cases, resulting in huge losses of people's lives and property. Therefore, the study of corrosion on the mechanical properties of CFST structures is required in academic value and practical engineering reference significance for accurate evaluation of the reliability of CFST structures. Rectangular cross-sectional columns in traditional frame structures, with extended corners to indoor space, normally have larger cross-sectional depths than those of adjacent infilled walls, leading to reduction of usable indoor space and disturbance to indoor environment. Recently, special-shaped columns, as an improved architectural approach, have been increasingly introduced into residential and official buildings. Smooth connection between special-shaped columns and adjacent infilled walls guarantees increased efficiency of indoor space and availability to furniture arrangement [1-5].

Special-shaped columns have been widely applied as the load carrying portion at corner of rooms in multi-story buildings in recent years. The special-shaped columns have satisfied the requirement of the architects and save more space to earn economic benefits. As the reinforced concrete (RC) structures are the most widely used in buildings, the special-shaped RC columns are firstly applied in structures. The action of L-shaped columns under the static load have been studied according to the extensive researches. The special-shaped RC columns possessed low load capacity and poor ductility according to the researches. As concrete filled steel tubes (CFSTs) can take good use of the concrete and the steel tube, special-shaped composite columns have been developed to avoid the weakness of special-shaped RC columns [6].

L- shaped columns may be the most frequently encountered reinforced concrete columns, since they can be used as a corner column in framed structures. Commonly L-shaped column is utilized in the corners of the boundary wall and has similar characteristics of rectangular or square column. L- shaped column has the advantages such as high bearing capacity, good ductility and high utilization rate of internal space. L-shaped columns are specially shaped concrete structures with asymmetric sections so the internal forced state is even more complex and creating large bending moments.

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Performance Of 3d Printed Pre Twisted Aesthetic Structural Duplet Columns

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Abstract:- The commercial finite element programme ANSYS is used to create a numerical model in order to examine the structural performance of 3d printing on attractive structural duplet columns. To create three-dimensional shapes, material is consecutively stacked while being controlled by a computer during 3D printing. It is highly useful for creating prototypes and geometrically challenging components. In this study, two I-shaped columns that are set up in series and parallel are taken into consideration. Let's examine the behaviour of the column at various rotational radii in both series and parallel arrangements. The ANSYS software was used to create 18 models (nine parallel and nine perpendicular). After the performance study is completed, strengthen the chosen model to determine which of these models has the best structural performance. Both inside and externally, steel plates and engineered cement concrete can be used to strengthen structures.

Keywords- ANSYS software

I. INTRODUCTION

Three-dimensional concrete printing (3DCP) technology appears to have generated the most attention among the currently available additive manufacturing (AM) techniques for concrete since both its overall technological level and economic value have been established. The implementation of typical demonstration projects has occurred with the advancement of 3DCP technology. The Eindhoven University of Technology printed a concrete structure in 2015 that was 11 metres long, 5 metres wide, and 4 metres high. A 3DCP office established in Dubai opened its doors in 2016. A 7.2-metre-tall, two-story office building was printed in 2019 by China Construction Second Bureau LTD. The office block was constructed on-site using 3DCP technology rather than printed concrete components. In 2017, the Institute of Advanced Architecture of Catalonia (IAAC) printed a 12-meter-long concrete pedestrian bridge. A team from Tsinghua University produced a concrete pedestrian arch bridge in Shanghai in 2019 using 3D printing technology. 44, 68, and 64 precast printing components made up the bridge's arch, railing, and deck, respectively.
However, there are several difficulties in using 3D-printed concrete buildings in actual technical applications. With a strong resistance to compression and a moderate resistance to tensile and flexural pressures, concrete is a common quasi-brittle material. The strengthening technique used when concrete serves as a material for AM is crucial for enhancing its mechanical qualities. To construct a building using 3DCP technology, freshly mixed concrete is extruded from the nozzle along a specified path and layered on top of one another. As a result, installing vertical reinforcement on printed concrete walls is challenging. Additionally, printed plain concrete walls have a low ultimate bearing capacity, limited cracking resistance, and are brittle.

3D printing

3D printing is the process of stacking material gradually while being guided by a computer to create 3D forms. Manufacturing geometrically challenging components and prototyping both benefit greatly from it. It can be accomplished using a number of processes that include layering materials (such as polymers, liquids, or powder grains) before using computers to regulate deposition, joining, or solidification.

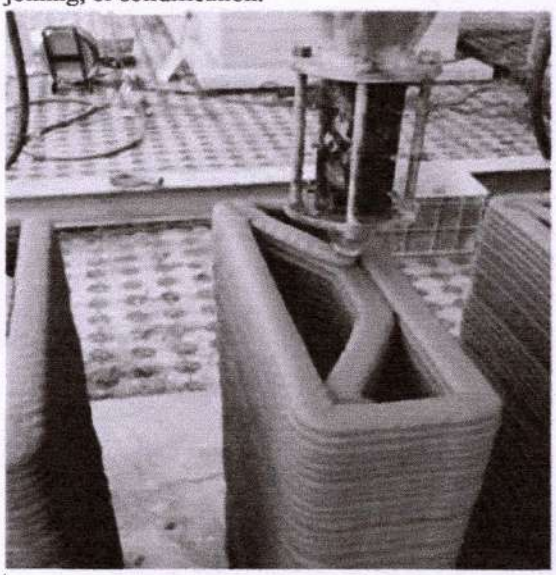

Fig 1- 3D Printing [1]

The term "3D concrete printing," sometimes known as "concrete printing," describes digital fabrication techniques for cementitious materials based on a variety of 3D printing technologies. These procedures are used in the building sector to create building components, building elements, civil infrastructure, and street furniture. Concrete printing can be used to create the finished object directly or indirectly by creating the formwork that will hold the concrete while it is being cast or sprayed. address for 3-dimensional formworks

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A Synopsis on Intelligent Face Discovery Frameworks

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Abstract: Image processing is a wide area which has attained attention over the last few decades. The traditional applications of image processing are surveillance, access control and authentication. This approach needs maximum information, in certain conditions it is difficult to gain those information such as small face detection, night person identification, partial face recognition, occlusion and so-forth. This paper provides an overview of general solutions of these challenges.

Keywords: Artificial Intelligence (AI), Image processing, IoT, Machine learning.

I. Introduction

There are many face acknowledgment frameworks present today. Surveillance cameras, when it comes to sending recordings at a high bit rate, chokes. It is additionally not functionalto store recordings for long duration. The nature of the countenances that is recognized by the camera is additionally problematic. Face recognition has become a well known region of examination in computer vision and quite possibly the best utilizations of picture investigation and comprehension. Face detection and extraction are computer vision task, that have numerous applications and have direct significance to the face recognition issue. Human face recognition has a wide spectrum of applications such as mugshot identification, social networking, automated crowd surveillance both in public and restricted areas, design of human computer interface(HCI). Face acknowledgment frameworks use computer calculations to select explicit, particular insights concerning an individual's face. These details, like distance between the eyes or state of the jawline, are then changed over into a numerical portrayal and contrasted with information on different appearances gathered in a face acknowledgment data set.

Image processing can be characterized as the specialized examination of a picture by utilizing complex calculations. Here, image is utilized as the input, where the valuable data returns as the output. In everyday the (pre-) processing of a picture is frequently an underlying advance to later concentrate the highlights that would be utilized to prepare a machine learning classifier. Signal processing can be utilized to upgrade or wipe out properties of the picture that could improve the performance of the machine learning algorithm.

Personal re-identification has attracted increasingly more consideration the computer vision eld because of its significant applications in numerous genuine situations like video recon-naissance, advanced mechanics, robotized driving. For the most part, person re-identification alludes to coordinating with a given walker across non-covering cameras in an organization.By and by, an individual re-identification framework comprises of individual indicator, individual tracker and individual matcher. Since person recognition and person tracking are in-dependent problems in computer vision, person re-identification as a rule centers around the third part and it is regularly viewed as a recovery issue.

Face detection is a central advance of many face related applications, for example, face alignment, face recognition, face verification, and face expression examination. Amazing face finders can precisely order and find faces from an image. Lately, deep learning techniques particularly convolutional neural organizations (CNN) have accomplished exceptional achievements in an assortment of computer vision errands, going from image classification, to protest identification, which additionally motivate face discovery. Dissimilar to customary strategies for hand-made highlights, CNN-based strategy can remove face includes consequently. Anchor-based face locators assume a predominant part in CNN-based face indicators. They distinguish faces by ordering and relapsing a progression of pre-set anchors, which are created by consistently tiling an assortment of boxes with various scale on the pictures. So it is sensible to indicate attributes in face pictures which are sufficient to characterize an individual. The ideal attributes

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An interwoven composite tailored finite point method for two dimensional unsteady Burgers' equation

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ARTICLE INFO

Keywords:
Two-dimensional unsteady Burgers' equation
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4-point stencil
Locally one-dimensional method
Operator splitting
Stability
Convergence

ABSTRACT

This paper centers on constructing a lucid and utilitarian approach to tackle linear and non-linear two-dimensional partial differential equations. To test the applicability of the proposed algorithm a variant of the classical two-dimensional unsteady Burgers' equation is set up as a testing ground. The method in a nutshell reduces to solving one-dimensional Burgers' equations resulting from the application of appropriate operator splitting techniques in the temporal direction. In solving these one-dimensional Burgers' equations a refined tailored finite point method in conjunction with an apposite linearization to the purpose is employed. The conditional stability, consistency, and convergence of the method are established theoretically and the method is found to be first-order convergent in time and second-order convergent in space. To illustrate the accuracy of the scheme, divers examples have been solved and the results obtained prove that this method is top-notch in terms of cost-cutting and time efficiency through the sufficiency of coarse meshes.

1. Introduction

A two-dimensional variant of the unsteady Burgers' equation which popularly models turbulent fluid motion is given by,

$$\frac{\partial u}{\partial t} + \gamma u\left(\frac{\partial u}{\partial x} + \frac{\partial u}{\partial y}\right) = \nu\left(\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2}\right), \quad (x,y) \in \Omega = [a,b]\times[c,d], \quad t \in [0,T], \quad \gamma \in \{0,1\}, \tag{1}$$

with the initial condition $u(x,y,0) = u_0(x,y)$ and the Dirichlet boundary conditions,

$$u(a,y,t) = \phi_1(y,t), \quad u(b,y,t) = \phi_2(y,t) \quad u(x,c,t) = \phi_3(x,t), \quad u(x,d,t) = \phi_4(x,t), \tag{2}$$

where u is the velocity, $\nu = \frac{1}{Re} > 0$ is the kinematic viscosity coefficient, *Re* is the Reynolds number, and $u_0(x,y), \phi_1, \phi_2, \phi_3, \phi_4$ are known functions. Eqn. (1) with $\gamma = 0$ is the linear heat equation germane to the mainstream areas like fluid dynamics, statistical mechanics, random processes, financial mathematics, quantum mechanics, image processing, spectral geometry, etc. The trailblazer in delineating the transient process of heat conduction through heat equation was Jean Baptiste Joseph Fourier, opening new grounds in mathematical physics through his book Theorie de la Propagation de la Chaleur dans les Solides [8] in 1807. A snippet on the evolution of the heat equation can be found in T N Narasimhan [27] in 1999. Eqn. (1) with $\gamma = 1$ is the non-linear Burgers' equation and the gravity of Burgers' equation is that most of the real-life models reduce to problems in shock flows, gas dynamics, non-linear wave propagation, turbulence, traffic flows, continuum traffic simulation, convection-diffusion phenomena, boundary layer behavior, acoustic attenuation in fog, etc. governed by Burgers' equation. The prime movers in revolutionizing Burgers' equation in

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Numerical Study of the Behaviour of the Intermeshed Steel Connections under Cyclic loading

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Abstract: ***Bolting and welding are the two connections which are commonly used in structural steel industry. Now the metal cutting technology has improved. Laser cutting, plasma cutting etc. are some of the new cutting technologies. Due to the evolution of these cutting technologies a new type of connection named intermeshed steel connection is introduced in structural steel industry. Bolting and welding are expensive and time-consuming operations. Easy disassembly is not possible in these types of connections. Steel is one of the best suitable materials which material reuse is possible. The introduction of intermeshed steel connection enhances easy disassembly and thereby improving material reuse. The non-linear finite element stimulations of side intermeshed steel beam to beam connection were performed using ABAQUS software. The beam flanges of the I section were connected by using dovetails and the performance of the beam flange connection is analyzed under cyclic loading.***
Keywords: ***Intermeshed connection, Finite Element Modelling, Steel connection, Dovetail, Technology***

I. INTRODUCTION

Bolting and welding are the two connections which are commonly used in structural steel industry. Both bolting and welding have advantages and disadvantages. Most commonly used connections include the bolted connections.

This connection has the advantage of flexibility in assembling parts of the structure as well as dissembling it and which is necessary if there is inspection or some routine maintenance.

Welding is the process of joining two pieces of metal by creating a strong metallurgical bond between them by heating or pressure or both.

Welding offers an opportunity to the designer to achieve a more efficient use of the materials.

Advanced manufacturing techniques, such as plasma, water jet, and laser can facilitate field assembly and disassembly of steel structural components, and therefore potentially transform how steel structures are designed and constructed.

These techniques have opened up an opportunity to create a new class of steel connections that rely on intermeshed. Presently, steel connections are almost exclusively made with bolts and welds. Both bolted and welded connections are labour intensive and contribute to a considerable portion of the total cost of a steel structure.

Recent developments in high-definition plasma, laser, and water jet cutting, when combined with fully automated computer-controlled techniques, could facilitate fast fabrication with high precision that may allow for the development of an entirely new class of steel connections to improve both erection efficiency and material reuse [4].

The intermeshed beam to beam connection is shown in Fig. 1.

Intermeshed flanges of I section are connected using four angle sections and the web of the I section is connected using shear plates and bolts of suitable dimensions.

High-definition plasma and waterjet cutting afford the opportunity to create alternative steel connections that rely on intermeshed components, instead of regular welding or bolting. Intermeshed connections transfer force through direct contact bearing of multiple, precisely shaped surfaces of the interlocking elements.

The potential impact of an alternative steel connection of this type that targets reductions in time and cost and simplifies disassembly for reuse is further highlighted by the dominance of steel in the construction industry [7]. Intermeshed connections can be divided in to two, front ISC and side ISC.

Here the analysis of side Intermeshed Steel Connection is carrying out.

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Pollution Analysis and Instream Treatment For Improvement of Canoli Canal

Revathi P, Mohanan Namboodiri P E

Abstract— Canoli canal or E K canal is a manmade water body flowing through Kozhikode city, constructed in 1848. The canal connects Korapuzha River in the north and the Kallai River in the south. Water quality parameters is tested in different months December, January, February in kallai, kalluthan kadavu, Arayidathupalam, Sarovaram and Korapuzha. The parameters examined are pH, turbidity, conductivity, COD, BOD, chloride, ammonia, nitrate, phosphate, sulphate, iron, fecal coliform and total coliform. Thus inorder to reduce the pollutant load the canal water is passed through a constructed wetland. This project aims at checking the efficiency of this instream treatment in reducing pollutant load.

Key Words— Canoli canal, Constructed wetland, Diversion canals, Instream treatment, Pollutant load, Removal efficiency, Water quality parameters

1 Introduction

The Canoly Canal is part of the West Coast Canal system and is situated in the city of Kozhikode. The canal is 11.4 km long, the width ranges from 6m to 20m and water depth in the peak rain period varies from 0.5 to 2m. The canal connects the Kallayi River in the south and the Mangala River in the north, passing through Kottuli wetlands and Perunthuruthi wetlands.The Canal is oriented to direct inflow from 4 water bodies Mangala River, Perunthuruthi Wetlands, Kottuli Wetlands and Kallayi River. The highest elevation is found at Kunduparamba and lowest at Kottuli.Topography of the region shows that the stretch of the canal from Elathur to Kunduparamba falls in the Mangala river basin, and the rest, from Kunduparamba to Kallayi, falls in the Kallayippuzha basin. The canal passes through the ridge between the two basins between Puthiyangadi and Kunduparamba; this is also the point that has maximum depth of the canal, minimum water depth and minimum tidal fluctuations.The depth of the canal ranges from 3.8m to 11m [1].

Canoli Canal, which is an artificially constructed canal, is flowing through the heart of Kozhikode city and is heavily polluted with the untreated sewage discharging into the water body. The source of pollution includes waste from hospitals, hotels, garages, timber industries, slaughter houses as well as residential areas. Many drainage outlets are connected to the canal and the water body receives the storm water, household grey water and sewage. All these activities contribute to the poor condition of the canal water [2].

2 Methodology

2.1 Sample collection

Five sampling points is selected in canoli canal. The points are kallai which is the starting point of canoli canal, Arayidathupalam, Kalluthan kadavu, Sarovaram and Korapuzha near eranjikkal which is the end point of canoli canal as shown in fig 1.

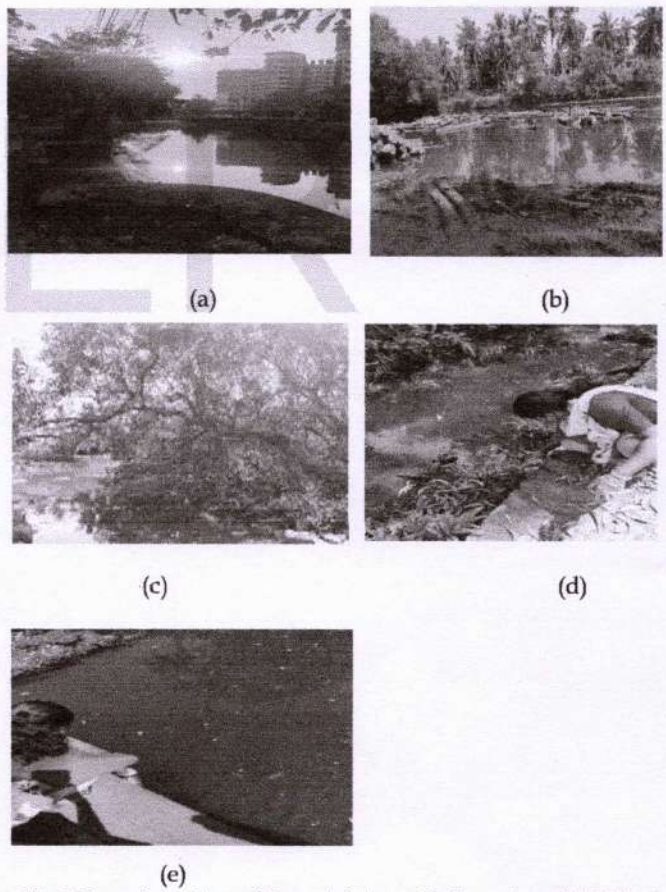

Fig.1 Sample collected from **(a)** Arayidathupalam **(b)** Kallai **(c)** Kalluthankadavu **(d)** Sarovaram **(e)** Korapuzha

Sample has been collected from these data points during months of December, January and February to analyse the seasonal variations.

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Adaptation of Corrugation Web in Cellular Beams with Hollow Flange

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Abstract:- Nowadays Cold Formed Steel (CFS) sections are extensively used in structural engineering works replacing the conventional hot-rolled sections. It is due to the inherent advantages of the CFS. In industrial buildings and also in multi-storey buildings it is mandatory to provide web openings and they are generally provided in CFS roof and flooring systems to accommodate the pipelines and the building services, which leads to the reduction of floor heights. The disadvantage of placing web openings are, it will influence the shear behaviour reduce the strength and shear capacity significantly. The beam stiffness will decrease when web openings are placed, so it will buckle the beam easily when high seismic force or working loads are acted. Also shear failure will takes place. To prevent these hollow flanges are provided with straight beams. So very limited research studies have been conducted on hollow flange CFS beam with web openings. In this study to avoid shear buckling, use the method of implementation of corrugated webs. This study is about how strength and the shear capacity are improvising by implementing corrugated design in cellular beams. Two methods are used for improvising. First is with different type of corrugated shapes. They are square type corrugation, rectangular type corrugation and trapezium type corrugation. Second is with varying the thickness of the web. In this method instead of stiffening the web externally, they are inbuilding it by these corrugation design. The test conducting are shear and flexural test. By this it is expected that the moment of inertia of web and strength will increase, also the possibility of shear buckling decreases. The complete study is carried out using a finite element method in ANSYs software. The results details that the corrugated web hollow flange cellular beams has less weight and more strength than the flat web hollow flange. So the corrugated web cellular hollow flange beams have better performance than the flat web cellular hollow flange beams.

Keywords: Hollow Flange Beam, Web Openings, Corrugated Web, Cellular Beams

1. INTRODUCTION

The installation of Cold-Formed Steel (CFS) components in contemporary construction is growing as a result of its benefits, including its light weight, high strength, flexibility, affordability, and ease of prefabrication. In Early in the 21st millennium, One Steel Australian Tube Mills (OATM) created a Hollow Flange Channel (HFC) section known as the Lite Steel Beam (LSB) by employing traditional cold rolling and then an electrical resistance welding technique. The hot-rolled conventional portions are heavier than the HFC sections, which are said to have a comparable bending strength. The LSBs are generally employed as structural components in structures for commercial, residential, and industrial buildings. Rectangular Hollow Flange Beams (RHFBs), a recently introduced steel member appropriate for extended span in many applications, are among the various open and hollow sections of CFS members.

Doubly symmetric RHFBs have better structural efficiency and buckling capacities than conventional CFS sections (Z-section and C-section) and hot-rolled I section. They consist of a central flat web plate with rectangular hollow flanges on the bottom and top of the section, as shown in Fig.1. Due to reduced web width and the absence of open edges, the section exhibits better local buckling capacity. Rigid hollow flanges further avoid distortional buckling caused by torsional effect. Fig.2. shows the hollow flange beam with circular web opening.

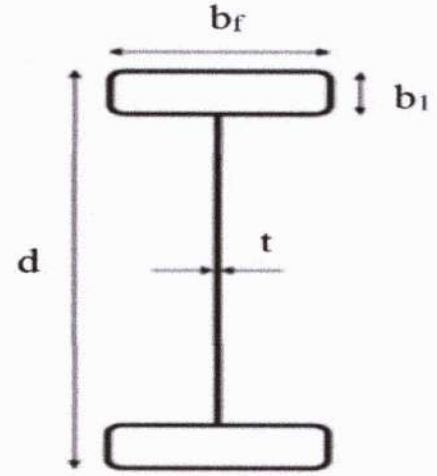

Fig.1. Doubly symmetric hollow flange beam [1]

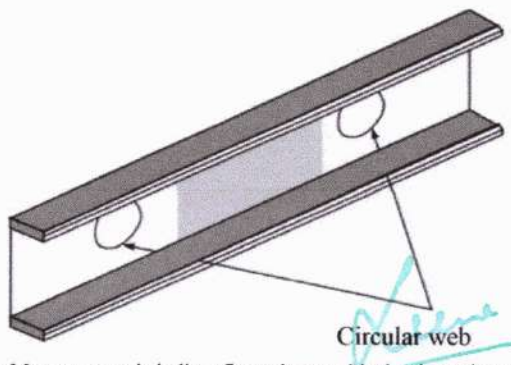

Fig.2. Monosymmetric hollow flange beam with circular web openings [1]

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Structural Performance of Grooved Gusset Plate Damper in Concentrically Braced Frame

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***Abstract*- The purpose of this study is to modify the braces by installing some energy dissipating device, which is added to the braces to absorb the energy and protects the structures from severe earth quake. Here we use Concentrically Braced Frame (CBF) with a metallic plate. It prevents all other member including beam, column, connection, and also braces from seismic damages and improves seismic performance of structure. The proposed device includes a gusset plate which is grooved so that it yields in several places and also prevents the plastic action or buckling in the braces. These types of device are known as Grooved Gusset Plate Damper (GGPD). The damper is a small plated metallic element. It can be installed in a braced frame then it act as an energy dissipater. It dissipates the energy from seismic through inelastic deformation at its steel strips and absorbs the complete shear. The finite element models of the braces are analysed using ANSYS and its structural performance is checked when the dampers are installed in different manner in a 3-bay 6-storied frame and three parameters are observed. Base shear, total acceleration and storey displacement.It is concluded that base shear of the structure is considerably reducing when the damper is installed in the frame. From the studies, it is concluded that lesser time period is produced for the model which occupied with complete braces and damper.**

Keywords: Grooved Gusset Plate Damper, Concentric Braced Frame, Seismic performance.

1. INTRODUCTION

Concentrically Braced Frame (CBF) is a type of bracings. They are mostly used in high rise building structures as lateral load resisting systems. A vertical concentric truss system with member axes aligned concentrically at the joints forms the CBF class of structures, which withstand lateral loads. Due to its great strength and stiffness, CBFs are typically effective in resisting lateral stresses. Recently, various studies have been planned to be conducted to enhance the braced frame's performance

Initially, simple braced frames were used. But by adding a few energy dissipation devices, additional adjustments are gradually made. Cost-effective steel energy dissipation devices were found to be applicable for minimal-damage seismic design of steel frames. To anticipate the fracture deformation capability of this device, more research is necessary. It can reduce damage repair costs and downtime, and, can be further enhanced by using rate-dependent dampers in parallel to steel devices to achieve drift reduction and protection of drift-sensitive non-structural elements [1].

Firstly damper plate connections were used by J.J Rogger Cheng et al. and where the ultimate load of the structure increased linearly proportional to the gusset plate thickness and decreases with increasing plate size [2]. The slit damper is introduced by Sang Hoon Oh et al. The proposed connection showed an excellent hysteretic behaviour[3]. A Low Yield Point steel gusset plate was proposed by Sheng Jin Chen and placed in to the frame. Then the energy dissipation capacity of the gusset plate is also increased substantially [4]. Based on the buckling analysis, utilizing Block Slit Damper (BSD) was proposed by Hossein Ahmadie Amiri et al. The BSD devices, one can decreases the costs and make sure that the utilized device is resistant to buckling while the energy dissipation efficiency is not decreased [5].After that Block Slit Dampers (BSD) were introduced by Mohemmad Reza Shirinkam et al. BSD is a box made of several steel plates which is mounted along diagonal members of a braced frame [6]. Unlike many existing seismic dampers, the stiffness and strength of the Box Shaped Damping device are not interdependent parameters and the designer can choose the required stiffness while keeping the strength constant. Also Application of Slit Beam in Eccentrically Braced Frame and An Innovative C-Shaped Yielding Metallic Dampers for Steel Structures are studied [7,8].At the same time a Modified Bar-Fuse Damper in Gusset Plate is introduced by Ramin Tabatabaei and found that it will be improve the seismic behaviour of the system[9].The structural performance of a concentrically braced frame is improved by installing an innovative shear damper and which effectively protects the structures[10]. A new brace type damper consists of two slit damper and it comprises a few perforated webs and two flanges (Perforated Web H-type Braced Damper PWHBD) was proposed by Baocheng Zhao et al. which are designed for protecting structure from earth quakes[11]. Improving the CBF Brace's behaviour using I-Shaped Dampers [12] and Torsional Hysteretic Damper for Frames (THDF), is introduced [13]. Gradually it changes to some gusset plates. But gusset plates will cause fracture because of post buckling deformation of the braces. So that strong brace member and weak gusset plates are used by M. Almohamad Albakkar et al.. Hence slits are provided in the gusset plate [14].

The slit dampers are a type of metallic damper. In this study a grooved gusset plate damper is installed in CBF and the complete performance of the structure will be checked. The complete study will be carried out by ANSYS software.

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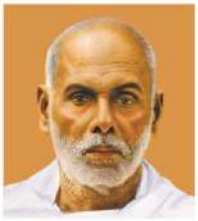

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Masked Face Identification by Ensuring Safe Social Distancing, Temperature Screening and Crime Detection

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Abstract: ***COVID -19 pandemic is the defining global health crisis of our time which eventually led to the use of face mask and maintaining safe social distancing, which became mandatory for reducing the rate of transmission of virus. This has parallelly raised a challenge in identifying people since most of the face regions are hidden inside the mask. So we came up with a system which identifies maked face along with which it ensures whether people follows safe social distancing or not. For this purpose we are using deep convolutional neural network (CNN) along with this MLP is also used for classification process. We also incooperates an efficient system that makes real time automated monitoring of people to detect safe social distancing and use of thermal cameras for detecting the body temperature. Thus the entire system favours the society by saving time and the automated inspection reduces the manpower to inspect the public.***

I. INTRODUCTION

Due to the pandemic humans are facing many difficulties and this has increased number of casualities and man securities problem.To tackle the pandemic everywhere everytime we human beings are wearing masks ,this has made the face recognition a very difficult task since most of the face are hidden. This system is providing us a reliable method by which it is easy to identify the face hidden under the mask . deep learning based approach is proved handy here. CNN is having strong robustness to illuminate facial expression facial occlusions. Efficient quantization based pooling method[22]for face recognition is provided by using VGG-16 pre trained model. The first step is to discard the masked region[1]to do so apply cropping filter just to obtain only informative regions of the masked face. Basically there are four steps discussed in this system for face recognition. In the first step ie ,in preprocessing and cropping filter, what we need to do is rotate the face so that we can remove the regions efficiently. To do so we detect 68 facial landmark and according to the eye location we apply a 2D rotation to make them horizontal. After this we apply cropping filter to extract only the masked regions. For this first we normalize the image and then partition it into different blocks. The principle behind this is to divide the image into 100 fixed sized block and we extract only the block containing non masked region. In the second step that is feature extraction layer[21], deep feature are extracted using VGG -16. Basically in pattern recognition task we need to estimate millions of parameters in the fully connected layer which requires high processing capacity and memory. So to tackle this efficient quantization based pooling method for face recognition using VGG-16 is used. Here we consider the feature maps at the last convolutional layer using bag of features. VGG-16 is consisting of millions of images and classes. Its name shows that it has 16 layers that is activation layer ,pooling layer,convolutional layer,fully connected layer etc . the features extracted in this step are used for quantization. In the third step, that is deep bag of features,the feature are now extracted we need to check or measure the similarities between the extracted features and the vector hence we apply RBF similarity metric. After this the quantization is applied to extract the histogram. The bag of features represents the image as a set of local features[21]. So first we extract the local features from the training image. After this all the features are quantized to a code book. By using bag of features this help to reduce the number of parameters and makes it possible to classify masked face. The RBF layer is measuring the similarities of input face. Finally, in the quantization uses output of RBF and proceeds with the classification process[1]. In the classification stage we assign each test image to the identity .To do this we apply multilayer perceptron classifier. Thus the image is processed.

Along with face recognition it incooperates another system which detect safe social distancing since it is mandatory to maintain atleast 2 meter distance between individuals. The first step in this process is to measure the distance of the person to be detected from the camera. For this purpose we are using triangular similarity technique by taking the distance of the person from camera as D and the focal length of camera as F and height of the person as H. After measuring the distance bounding boxes will be displayed around the people.

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An adaptive tailored finite point method for the generalized Burgers' equations

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Localized basis function
Global separation constant.

ABSTRACT

A tailored finite point method, using a minimal machinery algorithm yet utilizing the initial conditions and local properties of the solution to the hilt, is proposed to serve as a global platform to solve the generalized Burgers' equation. On an explicit centred 4-point stencil, the nodal solutions at the advanced time level are written as a linear combination of the nodal solutions at the preceding level. The scalars in this linear combination are determined using a set of basis functions. The extraction of these basis functions is through the fundamental solutions derived via the method of separation of variables. This, in turn, brings in the influence of the local properties of the general solution. The nodal maximum of the initial conditions is chosen as the separation constant to actuate continuous dependence on the initial conditions. Withal this separation constant works well for the generalized Burgers' equation, thereby instituting a common platform to solve these class of equations. The non-linearity is taken care of through an iterative technique where the non-linear term is replaced by an anterior temporal level iterated value. Conditional stability is established through the von-Neumann stability analysis. The method is consistent with second-order convergence in spatial variables and first-order convergence in the temporal variable. Numerical experiments are conducted on multifarious examples, and the obtained results are very much in accordance with the available exact solutions. The numerical results of examples with no useable closed-form representation of the exact solution are vindicated through the double meshing principle. Also, the error analysis establishes that the method works pretty well on coarse meshes, wherefore cutting the computational cost and increasing rapidity. Despite being a simple and straightforward algorithm with no usage of elite techniques, the method stands on par with quite a few methods in the literature.

1. Introduction

The generalized non-linear one dimensional Burgers' equation is given by,

$$\frac{\partial u}{\partial t} + u^{\mu}\frac{\partial u}{\partial x} = \nu\frac{\partial^2 u}{\partial x^2}, \quad (x,t) \in \Omega, \quad \mu \in \mathbb{Z}, \quad \mu \geq 1, \tag{1}$$

where,

$\Omega = (a,b) \times (0,T]$,

with initial condition,

$$u(x,0) = g(x), \quad a \leq x \leq b, \tag{2}$$

and boundary conditions,

$$u(a,t) = g_1(t), \quad u(b,t) = g_2(t), \quad 0 \leq t \leq T, \tag{3}$$

where $\nu > 0$ is the kinematic viscosity parameter, which controls the balance between convection and diffusion. $\mu \geq 1$ is an integer and $g(x)$, $g_1(t)$ and $g_2(t)$ are given functions of the variables which are sufficiently smooth. Eq. (1) with $\mu = 1$ is the Burgers' equation and Eq. (1) with $\mu = 2$ and $\mu = 3$ are the modified Burgers' equation-II and modified Burgers' equation-III denoted as MBE-II and MBE-III, respectively, throughout the context of this paper. Burgers' equation till date has been one of the most lauded equations ever since its unfold by an English mathematician Harry Bateman [1], in 1915 to illustrate the discontinuities that would arise in the solution of the equations of motion of a viscous fluid when viscosity close-in to zero. Such discontinuous limiting behaviour of the solutions opens to yet another substantial realm of boundary layer phenomena in fluid dynamics that evolved to investigative interest ever since its first mention by Ludwig Prandtl in 1904 at the third international congress of mathematicians in Heidelberg, Germany. Albeit the fountainhead of Burgers' equation accredits to Bateman [1], as the name honours, it has its genesis in [2,3] by the Dutch physicist Johannes (Jan) Martinus Burgers. Burgers back in 1940 and 1948 in a

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Laser Beam Welded Aluminum-Titanium Dissimilar Sheet Metals: Neural Network Based Strength and Hardness Prediction Model

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'Laser Beam Welding (LBW) is a welding technique used to join pieces of metal or thermoplastics with the aid of laser'. The beam offers a concerted heat source, which enabled higher, deeper welds and narrower welding rates. The procedure is commonly exploited in higher volume appliances using mechanization. It is dependent on penetration or keyhole mode welding. This paper intends to design a novel prediction model on LBW using the Optimized Neural Network (NN) framework. The input to the optimized NN is the welding properties like 'Laser power, welding speed, offset, shielding gas, flow/pressure, focal distance and frequency (where power, speed and offset gets varied)' that directly predict the hardness and tensile strength of welds since the NN is already trained with the provided data. In order to make the prediction model more accurate, this paper aims to train the NN using a new improved Trial Integer-based Whale Optimization Algorithm (TI-WOA) via updating the weight. Finally, the betterment of the suggested scheme is validated with respect to error analysis. Accordingly, from the analysis, it is observed that the proposed methods are 50%, 13.33%, 6.67% and 4% better than ANN-BP, RBF, ANN-GA and NN-WOA models, respectively, at 70th learning percentage.

Keywords: laser beam; power; speed; hardness; neural network; WOA; error analysis

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1. INTRODUCTION

'LBW is a fusion welding process in which two metal pieces are joined together by laser' [1, 2]. The beams produced from laser focuses on the cavity among the two metal pieces to be united. The laser beams include sufficient energy and at once it hits the metal, it produces heat that dissolves the metal from the two ends and fills up the cracks [3–5]. A strong weld is created among the two ends after cooling. Laser Beam Welding (LBW) is a much effective welding method and it could be easily programmed with robotics technology [6, 7]. This LBW process is mainly deployed in the automobile industries [8–10].

The most important part of LBW is laser machine [11–14]. It is a machine, which is exploited for producing a laser for welding [15, 16]. The most important elements of the laser machine are the power source, CAM, CAD and Shielding Gas. CAM quickens the process of welding to a larger level. In CAD,

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Demonstrating Antenna Miniaturisation for Radiolocation Applications using Double Elliptical Patches

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ABSTRACT

Double Elliptical Micro-strip Patch Antenna (DEMPA) is developed out of Double Elliptical Patch (DEP) which is a recently proposed shape of patch. The use of DEP results in higher flexibility in design of patch antenna and thus promotes antenna miniaturisation. The present work is an attempt to demonstrate the miniaturisation of radiolocation antenna through the concept of Design Flexibility (DF). In this paper, optimised neural network model for synthesis of DEMPA has been developed for radiolocation applications for which the earmarked frequency band is 8.50 GHz – 10.50 GHz. With the help of synthesis model, for an arbitrary operational frequency of 9.85 GHz, radiolocation antennas with effective patch area ranging from 142 mm^2 to 66 mm^2 were designed by using DEPs. In this case, the percentage reduction in effective patch area was found to be 53.52%. It shows that double elliptical patches can be employed to develop miniaturised radiolocation antennas. One prototype antenna was fabricated and tested to demonstrate the efficacy of the methodology adopted. The fabricated antenna had resonance at 10.15 GHz with a reflection coefficient of -20.73dB and bandwidth of 3.106 GHz (from 7.458 GHz to 10.564 GHz). Its Fractional Bandwidth was 34.469%. Positive and reasonably good gain was maintained over the entire working band. At resonance, the peak gain was 4.22 dB.The measured characteristics of antenna were in close agreement with the simulated results. The methodology presented in this paper can also be applied to frequency bands for other wireless applications.

Keywords: Double elliptical patch; Radiolocation applications; Antenna miniaturisation; Design flexibility

NOMENCLATURE

DEP	Double Elliptical Patch
DEMPA	Double Elliptical Micro-strip Patch Antenna
DEP_{mah}	DEP for which axis of symmetry is horizontal major axis
BPNN	Back Propagated Neural Network
DF	Design Flexibility
RF	Resonant Frequency
a_1	Semi-major axis of left half-ellipse of DEP_{mah}
a_2	Semi-major axis of right half-ellipse of DEP_{mah}
d	Common minor axis of DEP_{mah}
A	Effective patch area
SDEP	Similar Double Elliptical Patch
DDEP	Dissimilar Double Elliptical Patch

1. INTRODUCTION

Double Elliptical Micro-strip Patch Antenna (DEMPA) is a newly proposed family of patch antennas in which the shape of patch is double elliptical. In a Double Elliptical Patch (DEP), only one of the two sets of half-elliptical patches contains identical members unlike in the case of Elliptical Patch (EP). Either the right and left half-elliptical patches or the top and bottom half-elliptical patches will be different. The EP is a special case of DEP, where both the sets of half-elliptical patches are identical. Compared with EP, an additional degree of freedom in design is there for DEP, which provides greater flexibility in design of patch antenna and thus leads to antenna miniaturisation. The definition and constructional details of DEP have been reported in literature[1-2]. Also, the role of DEP in reducing the effective patch area has been discussed in length in those literatures. For a DEMPA with different left and right half-elliptical patches, the percentage reduction in the effective patch area was found to be 8.33%[1] and when the top and bottom half-elliptical patches were different, the percentage reduction was 10.714%[3]. A statistical technique, called Response Surface Methodology (RSM), was employed to predict one of the performance characteristics of DEMPA, its return loss[2]. This is the only parametric study reported so far in the literature with respect to DEMPA.

More studies need to be conducted to understand the parametric relationship between the shape-related input parameters and performance characteristics of DEMPA such as resonance frequency, impedance, gain and radiation pattern. Models for analysis and synthesis of patch antenna were capable of providing much insight into its radiation behavior with respect to the change in input parameters. Soft computing techniques such as Artificial Neural Network (ANN) were helpful to develop analysis and synthesis models of patch antenna. The antenna synthesis is to determine its dimensions and antenna analysis is to find out its resonant frequencies.

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Seismic Resilience Evaluation of Steel Frames With Y-Shaped Braces Equipped with Cost Effective Damper

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Abstract— **The steel frames are mainly installed in construction in order to resist the lateral force developed during the earthquake. They are having high stiffness and strength to resist the lateral systems, most of them do not have enough ductility and architectural performance. Y shaped bracing can deal with the architectural performance whereas the ductility of the braces is not sufficient. Due to the long length and sufficient compressive force in the members buckling occurs. The use of Steel Dual-Ring Damper (SDRD) in the frame of structure properly can solve the buckling risk. In this research, an innovative cost-effective Steel Dual-Ring Damper (SDRD) was used on the long member of the Y bracing to increase ductility capacity and reduce the buckling risk. A single-story single-span frame with Y shaped bracing was considered and subjected to lateral seismic load analytically. Using the nonlinear finite element method, the complete analytical model and parametric studies have been carried out using ANSYS work bench software.**

Keywords— Steel Dual-Ring Damper, Ductility, Compressive force, long length

I INTRODUCTION

The simple diagonal bracing to a bracing system consisting of several members are the different bracings used in the construction. Based on the structural and architectural demands the bracings are selected. Generally, the braced frames can be classified into two groups, concentrically braced frames (CBFs) and eccentrically braced frames (EBFs). In the case of concentrically braced frames, beams, braces, and columns intersect at a common point. This type of system has inappropriate behaviour and poor performance in terms of energy absorption during intense seismic loads due to the buckling of the braces and inadequate ductility. Y-shaped concentric bracing, which is commonly used to solve architectural problems, while this bracing does not have ad- equate ductility. Seismic energy-absorbing systems are used in structures in the form of steel dual ring damper, metallic yielding dampers, friction dampers, viscoelastic dampers, and viscous fluid dampers. The use of steel rings as dampers in controlling displacement and ductility as well as significant energy dissipation in concentrically braced frames systems (CBFs). The study on steel ring dampers as ductile and energy-absorbing elements in concentrically braced frames have shown good ductility, hysteresis-stable loops and energy dissipation. The main aim in the present study is to develop a full-scale model for a steel structure with braced configuration and perform the lateral loading testing on a braced steel frame with and without damper. Finding the optimum size of the damper in a full-scale model. The parametric study is carried by changing the parameters of the SDRD dimensions to find the optimum size that is bests suited for the seismic performance of the structure. To evaluate hysteresis performance and the energy dissipation capacity by placing SDRD damper in a Y shaped bracing system.

II OBJECTIVES

- To develop a full-scale model for a steel structure with braced configuration
- To perform the lateral loading testing on a braced steel frame with and without damper.
- To finding the optimum size of the damper in a full-scale model.
- The parametric study is carried by changing the parameters of the SDRD dimensions to
- find the optimum size that is bests suited for the seismic performance of the structure.
- To evaluate hysteresis performance and the energy dissipation capacity by placing SDRD damper in a Y shaped bracing system.
- Stiffness, Total dissipated energy, Hysteresis behavior

III SCOPE OF THE WORK

- An Innovative Cost-Effective Steel Dual-ring Damper (SDRD) was utilized on the member.
- Ductility capacity is enhanced and decrease the risk of buckling.
- Performing the effective model under cyclic testing to evaluate hysterias performance and the energy dissipations capacity of structure.

IV SUMMARY OF LITERATURE

The strengthening and retrofitting of the existing structure the steel bracing is one of the advantageous concepts. The concentric inverted V braced model gave better values for storey drifts when compared to other models and gives a better result. Steel frame with X knee bracing having less displacement and having high load carrying capacity compared to other bracing system. Y-HSS-EBFs (Y Shaped High Strength Steel Eccentrically Braced Frame) possess high elastic stiffness, good deformability, and excellent energy dissipation capacity. In the case of Y-shaped braces, the greater the distance between the junctions of the three

Effect of Bracing Location in PEB Under LTERAL Loads

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Abstract— **In Industrial building to cover and shelter a large area without supports, different steel structural roofing system becomes the most effective and economical instead of a concrete structure. Pre engineering building (PEB) is new type of building framing system adopted in the industrial building, the concepts is steel framing system, supporting members and roof covering are connected each other. The aim of this research work is to optimize the bracings for Pre Engineering Building (PEB) and analyse the behaviour of structure under different loads by using Etabs software. Present study is to analyse and design a PEB structure for different bracing location and finding the best location using Etabs software.**

Keywords— PEB, Bracing

I. INTRODUCTION

Industrial buildings, a subset of low-rise buildings is normally used for steel plants, automobile industries, utility and process industries, thermal power stations, warehouses, assembly plants, storage, garages, small scale industries, aircraft hangar, etc. . Mostly industrial buildings are constructed with steel material. Ordinary steel structure are made up of truss as a roofing system with roof top covering, it is called as conventional steel building (CSB). Technological improvement over the year has contributed immensely to the enhancement of quality of life through various new products and services. One such revolution was the pre-engineered buildings.

Pre engineering building (PEB) is new type of building framing system adopted in the industrial building, the concepts is steel framing system, supporting members and roof covering are connected each other. Pre-engineered steel buildings can be fitted with different structural accessories including mezzanine floors, canopies, fascias, interior partitions, etc. and the building is made waterproof by use of special mastic beads, filler strips, and trims. This is a very versatile building's systems and can be finished internally to serve many functions and accessorized externally to achieve attractive and unique designing styles. It is very advantageous over conventional buildings and is helpful in the low-rise building design. They PEB sections are used according to the bending moment requirement and are generally built up sections.

II. OBJECTIVES

The industrialization leads to the development of new advancement in the construction of industries. Large column free area and lower cost enhance the use of PEB in industrial building construction. The main objectives of the study are

- To analyse and design a pre-engineered building
- To analyze PEB structure under wind load.
- To optimize the bracing for lateral loads.
- To compare and evaluate the effectiveness of steel brace at different location.

III. SUMMARY OF LITERATURE REVIEW

From literature review, it is found that PEB have better performance compared to conventional steel structure and addition of bracing provide stability to the structure. They have good aesthetic view. In PEB the excess steel is avoided by tapering the section and is done as per the bending moment requirements in the structure. It is also seen that the weight of PEB depends on the Bay Spacing, with the increase in Bay Spacing up to certain spacing, the weight reduces and further makes the weight heavier.

IV. METHODOLOGY

The structure contain single storey PEB industrial warehouse. The plan is prepared using auto CADD. All the supports are pinned. Two types of models are analysed using ETABS software. The specification of structure are

Building Dimensions	40m x 100m
Type Of Roofing	G.I Sheet
Location Of Building	Bangalore
Bay Spacing for centre	7.727 m
Bay Spacing for gable end	7.500 m
Number of bays	13 No.
Wind Speed	33 m/s
Roof Slope	1in10
Clear eave height	5 m
Max eave height	7 m
Purlin Spacing	1.5 m c/c
Column Section(PEB)	Tapered
Rafter Section(PEB)	Tapered

3D Steel Truss Bridge with GFRC Deck

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Abstract— **In this paper, a 3D bridge truss is to be analyzed in (ANSYS Workbench) The floor material of the Bridge was changed to Glass fiber reinforced concrete. Compared to a normal concrete structure, GFRC Erection is simple due to the relative lightness of members. GFRP offers the designer a new combination of properties not available from other materials and effective rehabilitation systems. The high amount of glass fibers leads to high tensile strength while the high polymer content makes the concrete flexible and resistant to cracking. Because of the high early strength of GFRC, in part provided by the fibers, it can be demolded quickly. Most GFRC works can be demolded in 24 hours. Site details including span are taken from Vengara- Pazhayangadi (Major District Road) in which the bridgework (Box girder bridge) is going on.**

Keywords—GFRC; GFRP

I. INTRODUCTION

Truss structures that are comparatively simple to assemble and are more economical are used for many purposes such as crossing areas, railroads, and other transportation bridges. Steel truss bridges have more flexibility than concrete bridges. In this paper, a 3D truss bridge is to be provided with GFRP deck portions and is to be analyzed and designed in ANSYS WORKBENCH software. The truss component makes up reinforcement for the bridge. The truss dissipates the load through the structure as a result, the middle of the beam experiences less compression and tension. A truss is typically made up of a large number of triangles. The triangle is the strongest shape, when subjected to force it evenly distributes the weight without changing its proportions and maintains its shape in position. Deck portions are provided with the GFRP deck. GFRP possesses low weight compared to concrete It requires a short erection time through pre-assembly, and easy handling on site GFRP possesses more corrosion resistance When rectangular sections are subjected to forces, they will easily deform but if it is provided with diagonal or triangle members are provided, the stability of the structure will get enhanced. Squares are made up of four-sided but we can change the angle to any quadrilateral shape with the same sides. But triangles are different having 3 sides with valid lengths and we can't change the angles to get a new triangle with the same sides as there is exactly one triangle that we can make from those sides. This is how triangles hold their shape. And by interconnecting carry relatively heavy loads in truss bridges.

II. OBJECTIVES

- To conduct a literature review about 3D bridge Truss
- To familiarize with ANSYS workbench software
- To plan and model a 3D truss bridge with h GFRP deck by considering the requirements in Vergara
- To analyze 3D bridge truss.

III. SCOPE OF THE WORK

- The scope of the study has been limited to the analysis of a 3D bridge truss in Vergarara by the method of finite element software.
- The scope of GFRP is to be analyzed
- To achieve sound knowledge related to 3D bridge truss, ANSYS workbench software
- The aesthetic and structural advantages of composite bridge truss were a highlight
- The main components of the steel truss were analyzed using ANSYS workbench software.
- Models are prepared considering the relevant site conditions.

IV. SITE DETAILS

The total span of the bridge is 321.6 m, which consists of 5 number 25 m Span 3 number of 15.5 m Span 3 number of 9.5 m Span 1 number of 22 m 1 number of 21 m 1 number of 20.4 m 1 number of 27 m and Railway over bridge portion - 31.2 m Box girder bridge is the proposed one. Deferent crocross-sections are provided for support sections and mid-span sections. Box girders are connected with a pier with an elastomeric bearing.

The cross-sections in the support and midspan portions are shown below:

Disposable Knee Bracing in Combined Bracing System- Improvement in Seismic Design of Steel Frame using ETABS

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***Abstract*— Now a days, the use of braced frame systems has been expanded to achieve high stiffness and ductile structures in high seismic zones. Among the various types of bracing systems, such as x-brace ,diagonal etc. the knee bracing system has been mostly considered for seismic design in steel structures. In this system, the diagonal member provides the system's stiffness, and the knee member as a fuse provides the ductility and prevents the buckling of diagonal member; thus, it is expected that the stiffness and ductility of the structures will be remained strongly. In this study knee brace is integrated in the steel building with various bracing configuration and types of combined arrangement of different bracing (x type, diagonal inverted, chevron in frame is implied to test under Nonlinear Static Pushover (NSP) analyses, seismic analysis is carried out to compared with the corresponding concentric and eccentric frames. The output results like base shear, story drift, time period, and limit state check are compared and evaluated in ETABS.**

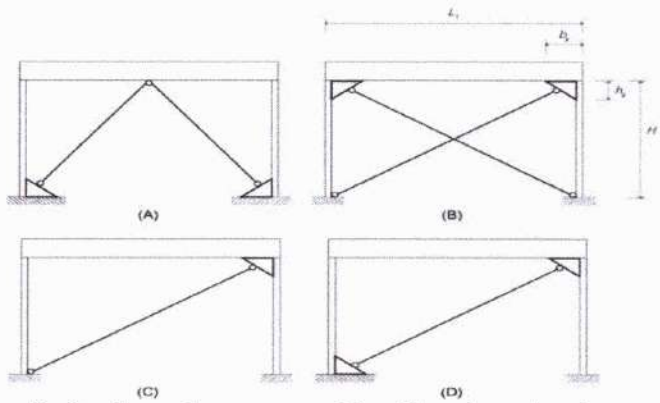
***Keywords*— Disposable knee brace,**

I. INTRODUCTION

The great strength, uniformity, light weight and many other desirable properties makes steel the material of choice for numerous structures such as steel bridges, high rise buildings, towers and other structures. Steel bracing provides an effective solution for resisting lateral forces in a framedstructures.

Knee braced steel frame has got excellent ductility and lateral stiffness. Since the knee element is properly fused, yielding occurs only to the knee element and no damage to major elements In recent years, the use of braced frame systems has been expanded to achieve stiff and ductile structures in high seismic zones. Among the various types of bracing systems, the knee bracing system has been specially considered for seismic design in steel structures. In this system, the diagonal member provides the system's stiffness, and the knee member as a fuse provides the ductility and prevents the buckling of diagonal member; thus, it is expected that the stiffness and ductility of the structures will be remainedsimultaneously.
In this study knee brace is integrated in the steel building with various bracing configuration types of combined arrangement of different bracing (x type, diagonal inverted, chevron)in frame is implied to test under Nonlinear Static Pushover (NSP) analyses, seismic analysis is carried out to compared with the corresponding concentric and eccentric frames.

2. OBJECTIVES



To develop and compare models of knee brace typein combined system in the steel frame against seismic force.

- Knee brace is integrated in the steel building with various bracingconfiguration.
- Combined arrangement of different bracing in frame taken such as X- type, diagonal, and chevron.
- The analysis carried out with and without DKB.
- Performing the nonlinear static pushover analysis to evaluate, yielding, ultimate displacement, lateral load, ductility and plastic hinge.
- Seismic analyses are carried out using nonlinear time history.
- The output results like bases hear, ductility, story drift, time period, limit state check are compared and evaluated in ETABS.
- Introducing new type of bracings, such as k-type knee brace, arch knee brace.

3. SUMMARY OF LITERATURE REVIEW

From the literature review the following conclusions were observed The knee-braced frames (KBF) include relatively simple connections for ease of construction and reparability after an earthquake and less obstruction as compared to conventional bracing systems. Lesser sway,

Structural Optimisation of Non-Seismically Detailed RC Beam-Column Joints using Prestressed and Prefabricated Steel Encasement

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Abstract— **Beam–column joints in reinforced concrete moment resisting frames are key components to guarantee integrity and overall stability when the frame is subjected to seismic loading. Poor reinforcement detailing at critical locations such as beam-column joint core can have detrimental consequences as it may lead to a global failure mechanism. An innovative and practical seismic retrofit method is proposed for non- seismically detailed external beam– column joints of existing concrete structures that do not meet current seismic design requirements. The objective of the study includes proposing a retrofit method based on two-dimensional enlargement of the beam–column joint using steel angles that are mounted on the prestressed cross-ties. The exterior reinforced concrete beam- column joints are tested under lateral loading with a constant axial load on the column and the analytical study is expected to show significant enhancement in seismic capacity of non-seismically detailed beam column joint. The proposed retrofitting method effectively prevent the brittle joint shear failure, relocate beam plastic hinges to outside the joint panel zone, increase the joint strength and energy dissipation. The complete analytical study is carried out using nonlinear analysis method in ANSYS software.**

Keywords: External beam–column joints, brittle joint failure, ANSYS software

I. INTRODUCTION

Beam column joint is defined as the portion of the column within the depth of the deepest beam that frames into the column. It is the Crucial zone and weakest link in a reinforced concrete (RC) moment resisting frame. Beam- column joint will enable adjoining members to develop and sustain their ultimate capacity. It is subjected to large forces during severe ground shaking and should have adequate strength and stiffness to resist the internal forces induced by framing members. Behavior of beam-column joint has a significant influence on the response of the structure. Catastrophic failures with Turkey and Taiwan Earthquake in 1999 is attributed to beam- column joint failure. Constituent material used for the construction of reinforced concrete structure have limited strength. So the joints have limited force carrying capacity when forces larger than these are coming on the joint. During earthquake, joints are severely damaged and repairing damaged joints are difficult. Thus beam-column joints must be retrofitted to resist earthquake effects. Seismic retrofitting is the modification of existing structures to make them more resistant to seismic activity, ground motion or soil failure due to earthquakes. The main aim of the present study is to determine the behaviour of RC beam-column joints retrofitted with steel plates and angles. Retrofitting is carried out based on two dimensional joint enlargement with steel angles that are mounted using prestressed cross ties.

II. BJECTIVES

- To model a beam- column joint
- To propose a retrofitting method for non-seismically detailed RC beam-column joints of existing concrete structures based on two dimensional enlargement of the beam- column joints using steel angles that are mounted using prestressed cross ties.

III. SUMMARY OF LITERATURE REVIEW

Various literatures are reviewed including the base journal [1]. There exist different methods for seismic retrofitting of RC beam-column joints. It includes retrofitting based on steel plates and angles, carbon and glass fibre reinforced polymer, concrete jacketing etc. Seismic retrofitting based on steel angles and plates is an effective method which will increase strength, energy dissipation etc. Overall performance of the structure under seismic loading can be improved through this method.

IV. JOINT ENLARGEMENT USING PRESTRESSED STEEL ANGLE CONCEPT

Seismic retrofitting is the modification of existing structures to make them more resistant to seismic activity, ground motion or soil failure due to earthquakes. One of the methods of retrofitting is based on joint enlargement using prestressed steel angle concept. Two steel angles and one plate is associated with each joint retrofit. Three steel elements are fixed in place using high tensile strength bars and the retrofitting is completely done using bolted connection. The

Structural Performance of Partially Precast Steel Reinforced Green Concrete Columns

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Abstract— **Steel reinforced concrete (SRC) column has been used because of its good structural performance and have high stiffness high load bearing capacity etc. This project includes study of behavior of partially precast steel reinforced concrete (PPSRC) column subjected to axial loading with demolished concrete lumps (DCL) . The objective is to investigate the performance (PPSRC) columns with green concrete (demolished concrete) and by varying the cross-section of core steel and core concrete. Factors like axial load - deflection curves ,failure modes, the strains of the steel section and the concrete were investigated using ANSYS.**

Keywords- partially precast column, green concrete, demolished concrete lumps

I. INTRODUCTION

Steel reinforced concrete (SRC) column has received much attention of structural engineers and researches because of its good structural behavior. The main advantages of this composite column are high load bearing capacity, great stiffness and inherent ductility. The concrete encasement not only improves the stability of the structural steel but also prevents the steel section from chemical corrosion and fire damage. Therefore, SRC column has been widely employed in the high-rise buildings and long-span bridges in recent years. However, it is generally admitted that the construction procedure is complex, particularly in assembling reinforcement and pouring concrete at beamcolumn connections. The PPSRC column is composed of a precast outer part and a cast-in-place part; precast outer-part consists of the steel shape, longitudinal reinforcement, stirrups and high performance concrete, which are prefabricated in the precast shop. After transporting the outer-part to the construction site, the inner concrete is simultaneously cast with the concrete in beam and slab. Here the inner concrete in PPSRC column can be cast by the normal concrete, lightweight aggregate concrete or recycled concrete. For hollow precast steel reinforced concrete (HPSRC) column, the inner part can be kept hollow to reduce the self-weight or filled with the fire resistive material to improve the fire resistance.

This study includes the behavior of partially precast steel reinforced concrete (PPSRC) column subjected to axial loading The main objective is to study the performance (PPSRC) columns with green concrete (demolished concrete) and by varying the cross-section of core steel and core concrete. Parameters like the failure modes, axial load versus deflection curves as well as the strains of the steel section and the concrete were investigated using ANSYS.

II . OBJECTIVES

- Study the performance of PPSRC with green concrete (demolished concrete) under axial loading
- Study the following parametric changes by varying cross sections of steel and
- Study the following parametric changes by varying infill DCL material

III. SUMMARY OF LITERATURE REVIEW

PSRC specimen with core shows a better deformation capacity under axial load. Partially precast members reduces transportation time and weight problems. Compared to traditional concrete, it produces less carbon dioxide, and is considered cheap and more durable. Green concrete has reduced environmental impact with reduction of the concrete industries CO_2 commissions by 30%.Green concrete is having good thermal and fire resistant

IV .FINITE ELEMENT MODELLING

The model is a 350*350 mm column of 1800 mm length. The modeling is done using Ansys software. Three demolished lumps of different compressive strength is used and analysed. The DCL having higher ultimate load is used for further study by varying the core section as octagonal, circular and square.

A. SECTIONAL PROPERTIES

The sectional properties are cross shaped structural steel of total height 200mm and width of steel shape are 200 mm and 100 mm, respectively, and the thickness of the web and flange are 5.5 mm and 8 mm, respectively. Four pattern plates are used .The stirrups of diameter of 8 mm spaced at 50 mm, arranged at the middle height of the column, and stirrups of diameter 8 mm spaced at 25mm were arranged at both ends of the column. Four longitudinal reinforcements, steel bars with diameter of 20 mm were also placed in the specimens. Shear studs of shank diameter 10mm and 30mm height is used

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Strengthening of the Deficient Steel Sections Using Hybrid Composites under Various Loading Scenarios

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Abstract— **Recently ,the strengthening of steel sections using various fiber reinforced polymer (FRP) has come to the attention of several researchers. For different reasons, this type of structures may be placed under combination of loads. The deficiency in steel members may be due to errors caused by construction, corrosion, fatigue cracking, and other reasons. This study investigated the behavior of deficient tubular hollow section (THS) steel members strengthened by HYBRID composite FRP under two types of combined loads. To study the effect of HYBRID composite FRP strengthening on the structural behaviour of the deficient steel members, various parametric studied were conducted by varying damage level, various strengthening methods were analysed. To analyse the steel members, three dimensional (3D) modelling and nonlinear static analysis methods were applied, using ANSYS software. The results expected that HYBRID composite FRP strengthening had an impact on raising the ultimate capacity of deficient steel members and could recover the strength lost due to deficiency.**

Keywords— Fiber Reinforced Polymer, Tubular Hollow Sections, Non Linear Static Analysis.

I. INTRODUCTION

Strengthening of the steel structures can be done using Fiber-reinforced polymer (FRP) FRP, also Fibre-reinforced plastic, is a composite material made of a polymer matrix reinforced with fibres. The fibres used are usually glass, carbon, or aramid. It is actually a stronger material than steel, making it a much stronger system whilst maintaining being a very lightweight material. Hence FRP is able to maintain its high strength even being a very lightweight material. Fiber reinforced polymer (FRP) composites or advanced composite materials are very attractive for use in civil engineering applications due to their high strength-to-weight and stiffness-to-weight ratios, corrosion resistance, light weight and potentially high durability. FRP outperforms wood and concrete structures, while holding up to decades of wear and tear. Fiber-Reinforced Polymer (FRP) composites offers five major benefits for any infrastructure , faster installation time, Lightweight material, Resistance to corrosion & very little maintenance, Cost savings, Design flexibility. Fiber Reinforced Polymer (FRP) includes a system of both carbon fibres and the bonding epoxy. The carbon fibres themselves are great in fire as they will not lose strength, even while glowing red hot. One drawback of FRP materials is their relatively high cost compared to other materials. Other drawbacks include: The need for various saw blades and drill bits than those used with wood or steel. Attention if irritation persists, or if severe coughing or breathing difficulty occurs. This provides the raw materials used for economical alternatives to conventional construction materials such as steel and wood. Most important in the context of sustainability, FRP manufacturing represents a radically low environmental impact over the traditional material preparation methods. Fiberglass reinforced plastics (FRP), are indeed initially more overpriced than traditional materials. However, it offers huge merits over these materials and has a lower overall cost of ownership and many other benefits. FRP panels are normally 0.09 inch in thickness and weigh about 12 ounces per square foot. Variations in material removal rates and hardness between the matrix and filler materials create difficulties in preparation such as polishing relief or rounding. These problems can cause wrong measurements, disguise problems or create artificial damage. Fiber Reinforced Plastics or Fiber Reinforced Panels (FRP) are plastics that contains fiber such as glass, carbon, aramid, or basalt. The deficiency in steel members may be due to errors caused by construction, corrosion, fatigue cracking, and other reasons. The use of externally bonded FRP has become increasingly popular for civil infrastructure applications. CFRP, GFRP, AFRP, BFRP etc. are some of the types of FRP. CFRP contains carbon as the fibre component, whereas GFRP contains glass as the fiber component. Moreover, CFRP is highly expensive, which limits the use of this material in many applications. BFRP – It is a composite material containing rigid polymer resin bounding unidirectional basalt fibers. Basalt Fibre Reinforced polymer bars have the advantage of corrosion resistance, high strength, light weight, good dielectric properties. AFRP- Aramid Fibre Reinforced Polymer is made up of aramid fibers, and have excellent corrosion resistance. The most common FRP systems for concrete strengthening applications are carbon based (CFRP). Carbon has high mechanical properties and higher tensile strength, stiffness, and durability compared with glass fiber based systems. Prefabricated FRP elements are typically stiff and cannot be bent on site to wrap around columns or beams. FRP fabric, on the other hand, is available in continuous unidirectional sheets supplied on rolls that can be easily tailored to fit any geometry and can be wrapped round

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Comparative Analysis and Seismic Performance Improvement of RCC Post Tensioned Flat Slab with Steel Composite PT Flat Slab System using ETABS

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***Abstract*- Looking at the modern trend of construction, RCC post tensioned flat slab are widely adopted in commercial and residential sectors due to its low cost of construction and aesthetic view. Post- tensioning, which is a form of prestressing, has several advantages over standard reinforcing steel (rebar's): It reduces or eliminates shrinkage cracking- therefore no joints, or fewer joints, are needed and Cracks that do form are held tightly together ,It allows us to build slabs on expansive or soft soil and It lets us design longer spans in elevated members, like floors or beams. Post-tensioning, or PT, has become increasingly popular over the past 30 years or so as the technology has been perfected. . While using PT method more precautions has to be made for shear and deflection criteria for the slabs since RCC post tensioning slabs are weak against lateral force. Post-tensioned slab structures have weak resistance to lateral loads. So to provide stiffness to structures against lateral forces steel columns are used. A study is carried out to compare the structure by replacing some of the RCC column with steel column to improve the stiffness of structure against lateral force. For this purpose a 15 storey RCC post tensioned flat slab in modeled using ETABS and analyzed for high seismic zone then improve the performance with different arrangements of RCC and Steel columns and the model is analyzed against the base shear, story drift, and story displacement. Also the cost analysis of RCC PT flat slab is compared with the composite PT flat slab**

Key words- Post Tensioned Flat Slab, Steel RCC composite structure, StoreyDisplacement, Drift, Stiffness

I INTRODUCTION

As the floor system plays an important role in the overall cost of a building, a post- tensioned floor system is invented which reduces the time for the construction and finally the cost of the structure. In some countries, including .The U.S., Australia, South Africa, Thailand and India, a great number of large buildings have been successfully constructed using post-tensioned floors. The reason for this lies in its Decisive technical and economical advantages.In modern construction high tensile steel reinforcement known as tendons are widely adopted in post-tensioned flat slabs. Post- tensioned slab helps in reducing tensile stresses and cracks of the member. Post- tensioned slabs have proved to be economical and effective compared to normal RCC beam-slab and RCC flat slab.

PT Flat Slab: Post-tensioned (PT) slabs are **typically flat slabs, band beam and slabs or ribbed slabs**. PTslabs offer the thinnest slab type, as concrete is worked to its strengths, mostly being kept in compression. Longer spans can be achieved due to prestess, which can also be used to counteract deflections. Post-tensioned slabs use high-strength tensioned steel strands to compress the slabs, keeping the majority of the concrete in compression. This gives a very efficient structure which minimizes material usages and decreases the economic span range when compared to reinforced concrete.

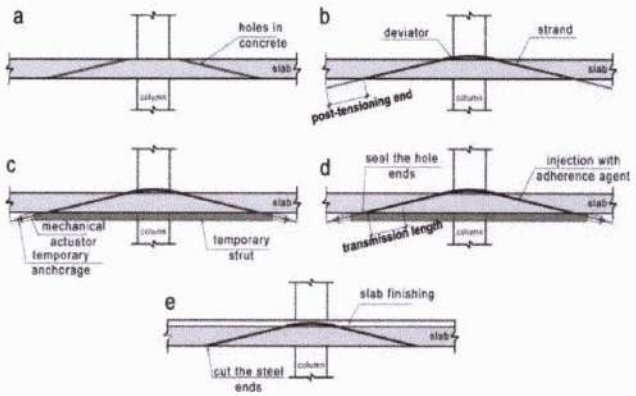

Fig.1.Post Tensioning Process

II OBJECTIVES

- To Model and Analyze RCC PT Flat slab for non linear time history analysis using Etabs
- To check the Storey Performance against real time PGA earth quakedata LOMAP
- To improve the stiffness of post tensioned flat slab by replacing theRCC column with steel column

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Cyclic Performance of Cross Slanted Corrugated Steel Plate Shear Wall with Beam Only Connected Infill Plates

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***Abstract*— Corrugated Steel Plate Shear Walls have gained significance and repute for being effective lateral force withstanding systems. Corrugated plates are characterized by higher out of plane stiffness and buckling stability than flat plates, assuring their enhanced hysteretic actions. In ordinary Steel Plate Shear Walls infill plates are fixed to beams and columns. But, detaching the infill plate from columns and connecting it to the beams only is assumed here as a system for reducing column demands. The current study explores the cyclic performance of Cross Slanted CSPSWs with beam only connected infill plates. The design of a one story single-bay specimen was done and its finite element model was developed by using ABAQUS software. Parametric studies have targeted CSPSWs with different geometric variables, including the orientation of the infill plate.**

Keywords*— *Corrugated steel plate shear wall, Cross slanted infill plate, Out of plane stiffness

I. INTRODUCTION

Steel Plate Shear Walls are frequently employed as lateral force resisting systems in building structures owing to their high stiffness, strength, and ductility. Steel Plate Shear Walls are either stiffened or unstiffened in type. Stiffened Steel Plate Shear Walls enjoy greater initial stiffness, higher shear strength, and bigger ductility than unstiffened ones. Corrugated steel plate shear wall which consists of a steel boundary frame and a corrugated steel wall panel with the corrugation in the horizontal or vertical direction, is a new sort of lateral load resisting system within the family of steel plate shear walls. Compared with the unstiffened special plate shear walls, Corrugated Steel Plate Shear Wall would have greater elastic buckling capacity and more resistance to the gravity loads transferred to the wall panel or avoid them, depending on the corrugation direction. Corrugated plates are characterized by higher out of plane stiffness and buckling stability than flat plates, ensuring their enhanced hysteretic behavior. In ordinary Steel Plate Shear Walls, infill plates are fixed to beams and columns. Detaching the infill plate from columns and connecting to the beams only is assumed here as a way for reducing column demands. The current study explores the cyclic performance of Corrugated SPSWs with beam only connected infill plates. Besides reducing column demands, beam only connected Steel Plate Shear Walls have other advantages. In beam-only-connected SPSWs, panels can be fabricated so that there would be a gap between panel edges and the columns, or several panels are often fabricated with a little panel aspect ratio installed parallel to each other during a span. In both cases, a gap space could also be easily given adjacent to the column without perforating the infill plate. Moreover, connecting the corrugated infill plate, especially a light-gauge one, to the boundary frame members was found challenging and difficult due to its thickness and geometry, that is, a matter that could prolong the construction time. In the case of beam only connected Steel Plate Shear Walls, the infill panel can be attached to the frame beams only, while the attachment between the infill panel and columns is ignored. However, the behavior of Corrugated SPSWs with beam only connected infill plates has not been studied before. This study investigates the feasibility of using corrugated plates as infill plates in beam only connected Steel Plate Shear Walls. We modeled and analyzed a one story single bay specimen using the commercially available software package ABAQUS. A parametric analysis was employed to research the mentioned model by varying its geometry. The parametric study incorporated corrugated plate orientation (horizontal, vertical, and cross slanted) and thickness of the corrugated plate.

II. OBJECTIVES

- Provide an efficient and accurate finite element model to understand the cyclic performance of Cross-Slanted CSPSWs with beam-only connected infill plates in the ABAQUS software.
- Parametric studies have targeted CSPSWs with different geometric variables, including orientation of the corrugated plate and infill plate thickness.

III. SUMMARY OF LITERATURE REVIEW

Corrugated Steel Plate Shear Walls have good seismic performance with higher buckling capacity, lateral stiffness, and out-of-plane stiffness than Steel Plate Shear Walls while offering additional advantages in construction convenience and serviceability. Subsequent experimental and numerical studies of Steel Plate Shear Walls with beam-only-connected infill plates demonstrated that these systems had good initial stiffness and lateral strength and considerable

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Analysis and Design of Mono Column Building

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***Abstract*— Mono column structure are the structures supported on a single column. They are the most suitable structures that can be constructed at the flood occurring regions. The structure provides large serviceable area as compare to RCC and steel frame structures. They provide large serviceable floor space compared to framed structures with many columns. They require less area for providing foundation and gives more space for parking. In this project describes planning, structural analysis, design and drawing. The mono column supports whole structure and other members will act as cantilevers. Structural analysis by ETABS.**

***Keywords*— Mono column**

I. INTRODUCTION

Mono column building is the structure supported on a single column which provides large serviceable area as compare to RCC and steel frame structure. Mono column building supported on a single column has more aesthetic view compared to other frame structures. The requires less area for providing foundation and gives more space for parking. They are also unique. Mono column structures are constructed with RCC or Steel. Mono column structures are complicated one, compare with the other framed structures, mono column supports entire structure, all other members will act as cantilevers and mono column structure is the individual one. Eccentric loading will cause failure of structure. These structures provide more proper spaces for offices and parking. Mono column provides maximum serviceability. They are also good at the place where flood occurs. Mono column buildings decrease the excavation area of the land and saving money. This project describes planning, structural analysis, design and drawings with various components of the whole building.

In India the state like Kerala facing flood in the monsoon season. The water level reaches approximately to the first floor of the building. The best solution of this problem is rising the living area higher from the ground level. Mono column buildings are very effective to control flood. Some of the two mono column structures are Astra Tower, Hamburg. Germany and L & T's Construction Headquarters at Manapakkam in Chennai.

II. OBJECTIVES

Rise in population have increased the demand of high-rise structures in the cities. Multistorey buildings aim to increase the floor area of the building without increasing the area of the land and saving money. These multi storey buildings, sky scrapers are built not just for economy of space they are considered icons of a city's economic power and the city's identity. Thousands of multi storey building is being built all over the world with steel as well as reinforced concrete. The main objectives of the study are

- To analyse and design a mono column building
- To compare the different shaped mono columns like rectangular and circular etc.
- To compare the serviceable floor space with structure supported on many column

III. SUMMARY OF LITERATURE REVIEW

From literature review, it is found that Mono column buildings has unique structure. They have good aesthetic view. Mono column structure can withstand all loads including earthquake loads and wind loads. Mono column building save ground space as requires less area for proving foundations and providing more space for parking.

IV. METHODOLOGY

The building contains four stories including the mono column. The plan is prepared using auto CADD. All the supports are fixed. The ground storey is designed and analysed. The height of mono column is 3m from the ground level. Each storey is 3m height. Two types of models are analysed using ETABS software. The first one is rectangular type mono column which support the entire structure. Another one is a circular mono column with same cross-section as that of the rectangular column. The structure is a residential building with four stories. The four stories supported by the 3m height mono column. The mono column extends to bottom to the top of the building.

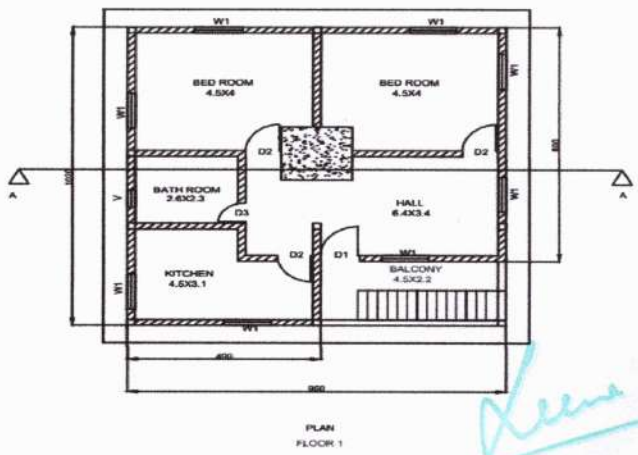

Fig.1. Plan of floor 1

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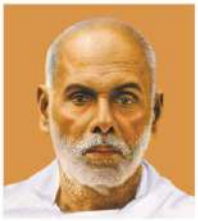

ACADEMIC YEAR

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Experimental Study on the Use of Magnetised Water in Basalt Fiber Reinforced Concrete

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Abstract - *Concrete is a composite material which is made from a mixture of cement, aggregates, water and sometimes admixtures in required proportion. Water is the main ingredient in concrete for the various process including hydration process, proper curing etc. Magnetised water technology initiated in Russia, was found to be a new technique for increasing the strength characteristics of concrete. Conventional concrete has limited ductility, low impact, less abrasion resistance and little resistance against cracking. The addition of fibers can improve the strength of concrete. In this study the effect of magnetised water on the strength characteristics of basalt fiber reinforced concrete (M20) with MSand was studied. Cubes, cylinders and beams were casted to determine the compressive, split tensile and flexural strength test of concrete. The fibers were added at different percentages varying from 1 to 5 % by weight of cement. The optimum percentage addition of fiber was obtained at 3 % by weight of cement. In this project magnetised water was used in mixing of concrete. The result of research work showed that incorporation of basalt fiber and magnetised water effectively enhances the strength properties of concrete. Use of magnetized water has promising potentials in saving the amount of water used in concrete construction.*

***Key Words*: 1) Magnetised water,2) basalt fiber, 3) compressive strength, 4) split tensile strength, 5) flexural strength**

1. INTRODUCTION

Concrete is the construction material which is used worldwide. Therefore, it comes as no surprise that enormous amount of research has been undertaken to enhance its performance. The major disadvantage is that micro crack develop in concrete during curing. These micro cracks developed are responsible for the low tensile strength of concrete Hence fibers are incorporated to concrete to overcome these disadvantages. The addition of fibers in the concrete mix has many important effects. Water plays a major role in the concrete preparation. Water plays an important role in workability and strength of concrete. Water is the main ingredient in concrete for the different process including hydration process, proper curing etc. When water is mixed with cement,it forms a paste which binds the aggregate. Water helps in the hardening of concrete by the process known as hydration. Water consumption is increasing tremendously as the population and human needs increases. Water consumption in agricultural sector is around 70% and in industrial sector it is 20%. In concrete production there is more than one billion tons of water consumed each year. Replacing normal tap water with magnetised water during concrete preparation can enhance the split tensioe strength as well the flexural strength of concrete. Water after passed through the surroundings of a magnetic field of certain strength is called magnetic field treated water (MFTW) or magnetised water.

1.1 Basalt Fiber

Many fibers are used in the construction industry such as glass polyethylene, carbon fiber etc., one of the new fiber called Basalt rock fiber is added to this list. Basalt is a rock ,which is brown or dark in color formed from volcanic lava after solidification. It has better strength characteristics such as good hardness and thermal properties. Basalt rock fibers impart high strength and low cost high performance to solve the problem in the large project like cracking, structural failure of concrete. The structure of Basalt fiber is shown in figure below (Figure 1.1)

Fig 1.1: Basalt Fiber

1.2 Magnetised water

When water passes through a magnetic field, it is known as magnetised water. After magnetisation, the bond angle

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STUDY OF MECHANICAL PERFORMANCE OF CONCRETE WITH THE ADDITION OF GRAPHENE OXIDE AS ADMIXTURE

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Abstract *- As the consumption of concrete increases, the production of cement is growing day by day. Portland cement process is a highly energetic process, and emits carbondioxide during calcination which has a crucial effect on global warming. Concrete, being the most widely used cement composite since it bears many advantages such as low cost, easy availability of constituents along with high strength and durability. However, disadvantages such as low tensile and flexural strength coupled with brittleness have promoted the addition of nanomaterials such as carbon nanotubes, graphene oxide, graphene nan flakes etc. The graphene oxide is chemically known as 'r-GO' ,atomically composite carbon, oxygen and hydrogen, a three-dimensional structure composed of millions of layers of graphite; existing in all body cast plain concrete or reinforced and which is possible to peel in the water, creating highly resistant layers in the material in which you are dispersed. This paper presents the strength properties of GO in cement- based composites such as compressive strength, flexural strength and tensile strength .*

Key Words: *Graphene Oxide*

1.INTRODUCTION

1.1 Introduction to Graphene Oxide

Cementitious materials are the most common construction materials used worldwide. They are generally brittle and have very low tensile strength and strain capacity. The concept behind such a transition to fiber-reinforced cement is that the resulting tensile strength is developed from many individual fibers rather than a few pieces of steel. Thus, use of discrete fibers results in greater uniform distribution of stress within cementitious materials Recently, carbon nanostructures such as carbon nanotubes (CNTs, both single and multiwalled), carbon nanofibers (CNFs), and Graphene have attracted attention from many concrete researchers due to their exceptional mechanical, chemical, thermal, and electrical properties, and good performance as polymeric reinforcement materials .Graphene is a single layer sp^2-bonded carbon sheet forming a honeycomb crystal lattice. Exfoliated graphene nanoplatelets have the same chemical structure as Carbon Nanotubes (CNT), and their edges are easily chemically modified for enhanced dispersion in polymeric composites [5]. Such nanoplatelets are typically less than 5 nm thick and can be synthesized with lateral dimensions ranging from <1 to 100 microns. Use of graphene oxide powder could open up many new applications such as high tensile strength and high compressive strength.

Fig - 1: Graphene Oxide

2. OBJECTIVES

The main objectives of this study are as follows.

- To study the behavior of concrete with Graphene oxide.
- To determine the compressive strength and flexural strength of Graphene oxide concrete.
- To find out the optimum quantity of Graphene Oxide required to achieve maximum compressive and flexural strength of concrete.

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SEISMIC ANALYSIS OF MULTI STOREY BUILDING WITH FLOATING COLUMNS USING ETABS

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Abstract - *In recent years, multi-storey and commercial buildings are constructed with architectural complexities. The floating columns buildings in seismically active areas are very dangerous. This paper studies the analysis of a G+10 storey normal building and G+10 storey floating column building for external lateral forces. The main objectives of this project are, to study the behaviour of multi storey buildings with floating columns under earthquake excitations, to find whether the structure is safe or unsafe with floating column when built in seismic zone III, to find the most critical and best position of floating column in G+10 building. Floating column building with shear wall also considered for the study.*

***Key Words*: Floating column, ETABS software, Zone III, G+10 storey, Earthquake, etc...**

1. INTRODUCTION

In Modern construction technology major concern is given for architectural and other features, most of the multi storied buildings having open ground storey as an obligatory feature to afford parking area, reception lobbies and for other architectural needs. Now a days multi-storey building construction for residential, industrial or commercial purpose has become a common feature, These multi-storey building need more parking or open spaces below. This open ground storey concept leads to interruption of columns called floating columns, which makes the building lateral irresistible. This concept of floating column is driven from the architectural needs to bring out aesthetic view to building, and also to overcome FSI (Floor Space Index) restrictions. Even in commercial building there might be a need for conference hall or banquet hall on the floors below. For these purposes we prefer to have open space rather than having columns in between. In this case floating columns come into the picture. Floating columns gives the liberty to change the floor plans above. Like in any other structure, the load from the floors above is transferred to the column. The entire load is then transferred to the beam on which the floating column rest. The floating column is designed as a regular column. The beam on which the floating column rests is designed as a beam carrying all the load of the column as a single point load. This beam referred to as girder beam or transfer beam usually having big cross section with heavy steel. This girder beam is also subjected to torsion. The design and detailing of this girder beam is very crucial in the construction of floating columns buildings. During earthquakes the behaviour of a building depends critically on its overall shape, size and geometry, in addition to how the earthquake forces are carried to the ground. The earthquake forces developed in a building need to be brought down along the height to the ground by the shortest path. Any deviation or discontinuity in this transfer load results in poor performance of the building.

1.1 Floating Column

A column is a vertical member starting from foundation level and transferring the load to the ground. The floating column is also a vertical element which (due to architectural design/ site situation) at its lower level (termination Level) rests on a beam which is a horizontal member. The beams transfer the load to other columns below it. Usually columns rest on the foundation to transfer load from slabs and beams. But the floating column rests on the beam. The floating column is designed as a regular column. The beam on which the floating column rests is designed as a beam carrying all the load of the column as a single point load.

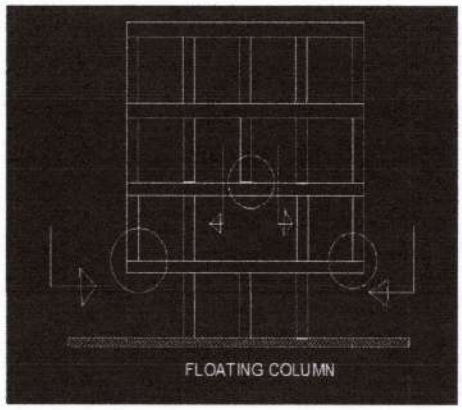

Fig -1: Floating column

Floating columns are adopted in many projects, especially above the ground floor, where transfer girders are employed, so that more open space is available in the ground floor. These open spaces may be used for assembly hall or parking purpose. The transfer girders have to be designed and detailed properly, especially in case of earthquake zones.

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Design and Analysis of a Typical Grid Fin for Aerospace Application

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Abstract *- Grid fins (or lattice fins) are a type of flight control surface used on rockets and bombs, which consist of lattice shaped structure attached together to form a fin. The major advantage of such fin is that, they can be easily assembled to the launch vehicle and can be operated for stipulated time duration whenever required. The deployment mechanism imparts more dynamic loads on to the fin and so the structural dynamics play a vital role in its design. To get maximum stability, the fin mass should be minimum as possible by the functional point of view. But the structure should withstand all the static and dynamic loads for the operation period. The lattice structure makes the structure more complex as per the realization aspects. A limit state design methodology is attempted for this Titanium grid fin structure to arrive at an optimum structural configuration. The design optimization and validation through finite element analysis is carried out using in house developed finite element FEAST (Finite Element Analysis of Structures) software by Vikram Sarabhai Space Centre (VSSC).*

Key Words: **Grid Fin, Flight control surface, Deployment mechanism, stipulated time, limit state design, methodology, optimum, finite element, FEAST software**

1.0 INTRODUCTION

The grid fin is a lattice structure. It is used to provide the stability and control of launch vehicle and missiles. Advantages of the grid fin over the conventional planar fins are higher strength to-weight ratio and lower hinge moment. Therefore it can contribute to mitigate the requirements for a control actuator of the fin. On the other hand, its higher drag is a significant disadvantage. Grid fins are widely used in Crew Escape Systems (CES) of manned space missions of many countries.

During the normal launch phase grid fins function as aero stabilizers. Then they are stowed against the cylindrical body which helps to reduce overall dimension of the vehicle and minimize aerodynamic disturbance. In case of launch abort situation for effective functioning the grid fins deploy to achieve the required static margin for the control of the crew escape systems.

In the current study, grid fin is configured with Titanium alloy. The structural design of the grid fin is carried out for the aero loads and moments. The design is validated through analysis. The FEAST software developed by VSSC is used for the analysis of grid fin. A typical grid fin configuration is shown in Figure 1.

1.1 Scope and Objectives of the Study

The main objectives and scope of the study are

- To design the Grid fin structure using Limit State Method.
- To analyze Titanium Grid fin structures of an Advance Launch Vehicle using FEAST software in house developed by VSSC.
- Design Optimization of grid fin for the different materials subjected to design constraints.

2.0 DESIGN OF GRID FIN

The Grid fin structure is designed using Limit State Method. Yield stress of Titanium is considered as 880 N/mm² and Partial safety factor of Titanium against yielding as 1.035, which is derived from tested yield and ultimate strength properties. Design forces are evaluated from the simplified beam model of the grid fin structure with assumed section dimensions. Detailed design computation for the grid fin panel sections are given in Table 1. The section requirement of each lattice panel of grid fin subjected to axial load and bending moments are calculated and the calculation of one typical panel of 8 X 150 mm cross section is shown below:

CASE 1-MAXIMUM AXIAL FORCE CONDITION

- Maximum axial force = 2486.1 N
- Bending Moment (BM1) = 523.75 Nmm
- Bending Moment (BM2) = 2370.25 Nmm
- Factored axial force (N) = 3729.15 N
- Factored Bending Moment (BM1) My = 785.62Nmm
- Factored Bending Moment (BM2) Mz = 3555.375Nmm
- Breadth = 8mm
- Depth = 150mm
- Design strength in tension (N_d) = $A_g f_y/\gamma_0$

where, A_g = gross section area of cross section
f_y = yield stress
γ_0 = partial safety factor in yielding
N_d = 8x150x880/1.035 = 1020290 N

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PERFORMANCE AND OPTIMIZATION OF OUTRIGGER WITH BELT TRUSS SYSTEM IN MULTISTORIED BUILDING

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Abstract *- The outrigger system is one of the most common and efficient systems that can be used to improve the performance of tall buildings under wind and seismic forces. An Outrigger is a horizontal projection attached to any member and helps in increasing its stability. When the height of the structure increases, the building stiffness becomes more important and introduction of the outrigger beams between shear walls and external columns is often used to provide sufficient lateral stiffness to the structure. The objective of the study is to optimize outrigger and outrigger with belt truss system location and to access the efficiency of each outrigger used in the structure and different types of bracings adopted at optimum position. The analysis is done by considering the models of normal building, symmetric setback building and asymmetric setback building. The analysis is carried out in ETABS 16.0.2*

Key Words: Outriggers, Lateral loads, Displacement, Base Shear, Lateral Stiffness, Belt truss system.

1.INTRODUCTION

The outrigger and belt truss system acts very important role to resist the lateral loads in the structure. In this structure the external columns are tied to the central core wall with stiffened outriggers and belt truss at one or different levels. The outrigger beam and belt truss system is the lateral loads resisting system in which the central core is tied to the external columns with very stiff outriggers beam and belt truss at one or more levels. The belt truss tied the peripheral column of the building while the outriggers engage them with main core or central shear wall. The core may be centrally located with outriggers extending on both sides or it may be located on one side of the building with outriggers extending to the building columns on one side. The outrigger and belt truss system effectively control the excessive drift due to lateral load and minimize the risk of structural and non-structural damage. Outriggers are stiff elements connected to a structure core to outer columns. The outrigger with belt truss system improves the structural stiffness of building against overturning moment by developing a tension-compression couple in perimeter columns when a central core tries to bend, generating restoring moment acting on the core at the outrigger level.

The concept of the conventional outrigger is the outrigger trusses are directly connected to the shear walls or braced frames at the core of the structures. The basic principle is the same as when belt trusses are used as virtual outriggers. Some of the moment in the core is transformed into a horizontal couple and transferred to the truss chords in the floors at the top and the bottom of the diaphragm and it finally converted into vertical forces at the exterior columns. The fundamental idea behind the virtual outrigger system is to use rigid floor diaphragms, which are very stiff and stronger in their own plane, to transfer moment in the form of a horizontal couple moment from the core to trusses and trusses to exterior column. Basement walls and belt trusses are appropriate to use as virtual outriggers. The way in which overturning moment in the core is converted into a vertical couple at the exterior columns in case of conventional outrigger, rotation of the core is resisted by floor diaphragms at the top and bottom of the belt trusses; thus, part of the moment in the core is converted into a horizontal couple in the floors. The horizontal couple, transferred through two floors to the truss chords, is converted by the truss into vertical forces at the exterior columns.

2.SCOPE

The main scopes of this study are follows.

- The building models are compared by changing the soil interaction or types of soil to provide better information about the response of the system.
- The behavior of building for other types of irregular building can be studied. The base isolation or spring technique may be used with outrigger structural system.
- The behaviour of building for other types of braces can be studied

3. OBJECTIVES

The main objectives of this study are follows.

- To find out the optimum location of outrigger in normal building, symmetric setback building and asymmetric setback building.

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SEISMIC BEHAVIOUR OF MULTISTORIED BUILDING WITH OBLIQUE COLUMN AND IT'S HEIGHT OPTIMIZATION

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Abstract *- As earthquakes are one of the greatest damaging natural hazards to the building, the design and construction of tall structures which is capable of resisting the adverse effects of earth quake forces is the most important. Nowadays various construction techniques are adopted in order to increase the seismic performance of the building. Here the new method is to use the oblique columns instead of normal columns. Oblique columns are columns at an angle to the specified line. The Oblique Columns are neither parallel nor at right angles to a specified line means they are slanted or Rotated at an angle. Oblique columns are provided up to various height of the building. The analysis is carried out in ETABS16.0.2.*

Key Words: *Lateral load, Oblique column, Normal column, Earthquake force, ETABS.*

1.INTRODUCTION

The new construction method to increase the seismic performance of multi-storied buildings is the use of oblique columns instead of normal columns. Oblique column is a column which is not constructed vertical. The position, arrangement, and angle of the inclined columns are makes different types oblique columns in buildings. The angle may vary and this affects the performance of the building. It affects the lateral stiffness of the buildings. But the seismic responses may vary in each case. The seismic performance should be studied to know whether these new construction techniques adaptable or not. Because, the performance of the high-rise, mid-rise and low-rise building will be different from each other for different angles under seismic loading.

In recent years, many buildings are constructed in irregular structure system with inclined columns. It effects on the structural behaviour of the joints. The Oblique Column is the column, which neither parallel nor at right angles to a specified line means they are slanted or rotated at an angle. Since the external loads leads to shear and flexural forces on the inclined column, the performance of the building is differs from the conventional method of construction. Oblique columns are stiffer as RC frames, and therefore, the initial stiffness of the RC frames largely depends upon the stiffness of oblique column

2.SCOPE

The building models are compared by changing the soil interaction or types of soil to provide better information about the response of the system. The behavior of building for other types of irregular building can be studied

3.OBJECTIVES

- To analyze seismic performance of multi-storey symmetrical and asymmetrical structural building with oblique columns.
- To analyses seismic performance of symmetrical and asymmetrical structural building with oblique columns at various height.
- To compare the performance of multi-storey structural building with normal and oblique column.
- To optimize the height of oblique column.

4.METHODOLOGY

4.1 Modeling and model analysis

Etabs software is used for modeling and model analysis. Building configuration and loading data's for models are given. In this project the models are normal building, building symmetrical to both axis, building symmetrical to one axis and building asymmetrical to both axis. Building with oblique column up to various heights are also modeled and analyzed. Time history analysis is done

4.2 Loading consideration

- Live load : 3kN/m^2
- Floor finish : 1kN/m^2
- Seismic loading (IS : 1893 (Part I) -2002)
- Zone factor : 0.16
- Medium soil
- Response reduction factor– 3

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Economic Evaluation and Comparison of Green Building with Conventional Building using Carbon Footprint and Embodied Energy Calculator developed using MATLAB

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Abstract- *The idea of Green architecture, also known as "Sustainable architecture" or "Green building," is the design and construction of buildings in accordance with environmentally friendly principles. Green house strives to minimize the number of resources consumed in the building's construction, use and operation, as well as lessening the harm done to the environment through the emission, pollution and waste of its components. Embodied energy is the amount of energy consumed to extract, refine, process, transport and fabricate a material or product (including buildings). It is often measured from cradle to grave. Likewise, embodied carbon footprint is the amount of carbon (CO_2 or CO_2e emission) to produce a material.*

This paper aims to develop a MATLAB program to estimate the carbon footprint and embodied energy of the building and suggest simple economical way of constructing a green home. Also, the structural stability of conventional building and green building is compared using ETABS Software.

In an effort to improve the accuracy of embodied energy and carbon footprint calculations, this paper presents a tool that estimates the total carbon footprint and embodied energy of buildings by taking into consideration various project characteristics (e.g size, location, material choices).

Key words: *Green architecture, Embodied energy, Carbon footprint, MATLAB, ETABS*

1. INTRODUCTION

Various researches prove that construction industry consumes large quantity of environmental resources and it is one of the largest polluter of the environment that is it contributes approximately 30% to total global GHG emissions. We know, every year millions of new buildings are being constructed and new construction materials are being introduced.

Now, green construction practice has gained tremendous popularity these days due to the increased population and pollution. It is the application of processes that are environmentally responsible and resource-efficient. Green building is considered as a way for the building industry to move towards protecting the environment. Main aim of this construction practice is to obtain a balance between economic, social and environmental performance in implementing construction projects.

Every building has a life time. If we consider this as a cycle, the building has its life cycle from cradle to grave. Therefore, in order to study the emissions caused from a building, a complete life cycle analysis is needed. This is an internationally standardized method. So once the carbon footprint and embodied energy of the building is known, a strategy can be developed to reduce its impact on the environment.

2. SCOPE

The scope of this paper highlights the benefits of green construction. We know, overall benefits of a green home includes energy efficiency, design flexibility, resource conservation, better indoor environmental quality etc. Also, reducing a buildings carbon footprint reduces its running cost, raises property values , improves LEED scores etc., thus the buildings become environmentally responsible, profitable and better place to live and work in.

Research on green building design and materials is already firmly established. There are many global platforms that discusses on environmental protection which aims to create a better earth. Green buildings when compared to conventional buildings are same in building use but differ in operational savings and takes into account for human comfort, indoor quality and environment and also enjoys the benefit of saving energy.

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ALUM SLUDGE - A PARTIAL REPLACEMENT TO CEMENT IN CONCRETE

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Abstract - *A method to use sludge waste from water treatment plant and to reduce the environmental pollution by it has initiated the studies on possibility of integrating this waste in concrete production. The aim of this research work is to use alum sludge powder as a partial replacement of cement in concrete. In this research study an experimental investigation was conducted on varying percentages of (0%, 5%, 10%, 15%, and 20%) alum sludge powder as cement replacement for M20 grade of concrete to produce alum sludge concrete. Different tests were conducted to find the properties of materials used in concrete. Properties of concrete were obtained by strength test and durability test. The optimum percentage of replacement of alum sludge powder as cement in M20 grade of concrete was obtained as 15%. The results of the research work show that alum sludge powder is an effective alternative for partial replacement of cement in concrete, which also results in a good method of using this waste material in concrete.*

Key Words: **Concrete, Alum sludge, Strength test, Durability.**

1. INTRODUCTION

Among all other materials, concrete is the most widely used in construction industry. From a small residential building to large infrastructure projects like dams, tunnels, multi storey buildings etc, concrete is being used. Being a multipurpose material, it is difficult to replace concrete with other construction materials. The main ingredients used for concrete production are cement, fine aggregates, coarse aggregates and water. Each and every material in concrete has its important role in overall performance of concrete. During the production of cement, our natural resources are being consumed and CO_2 is emitted in to the atmosphere. The heat of hydration also leads to increase in temperature of environment and this heat is also responsible for cracks in a structure after hardening of concrete. So there is a need to find some alternative material to reduce the production of cement and its use in concrete.

The sludge generated in water treatment plants consists of organic and inorganic compounds in solid, liquid, and gaseous states, and varies in terms of physical, chemical, and biologic characteristics. The remaining volumes that are wasted depend on the characteristics of the operational units involved and the quality of the raw water. Several chemicals have been used for water treatment, some of them include aluminum salts ($Al_2(SO_4)_3.18H_2O$), ferric ion salts (such as $FeCl_3.6H_2O$), and ferrous iron salts (such as $FeCl_2$, $FeSO_4.7H_2O$). The addition of these chemical substances during water treatment may result in iron- or aluminum-rich sludge. These salts may be present in high concentrations that can be toxic to aquatic biota. To avoid this toxicity, the salts should be properly treated before disposal. Sludge from water treatment plants may also contain other heavy metals from raw water or from contaminants resulting from the addition of coagulants. All the chemicals mentioned above are harmful to the environment if it is not properly disposed. So using the sludge waste as a partial replacement for cement in concrete is a good idea for reusing the waste material.

In this research work alum sludge powder was used as a partial replacement for cement in concrete. Alum sludge (AS) is actually a by-product of water treatment plants that use aluminum salts as a primary coagulant, and is the most widely generated water treatment residual/sludge worldwide. It usually contains colloidal alum hydroxides which are often amorphous species. Aluminum sulfate ($Al_2SO_4.18H_2O$) is the most commonly used coagulant in drinking water treatment plants and as a result, tons of aluminum hydroxide containing sludge is unsafely disposed into the open environment daily. Alum sludge as waste materials are commonly sent to landfill.

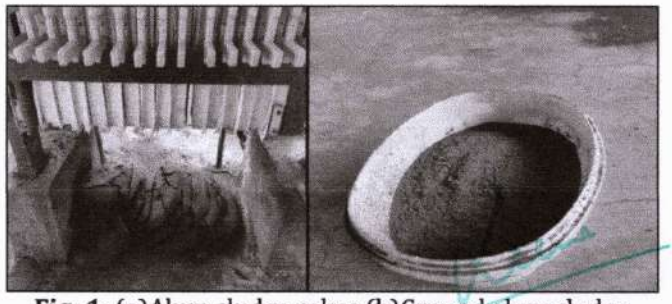

Fig -1: (a)Alum sludge cakes (b)Ground alum sludge

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CYCLIC ANALYSIS AND BENDING PERFORMANCE OF SPLICE CONNECTION ASSEMBLY OF FRP COLUMNS IN MODULAR BUILDINGS

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Abstract *Extensive research has been carried out in recent years on the use of fibre-reinforced polymer (FRP) composites in the rehabilitation and strengthening of existing structures. This paper provides a concise review of Investigation on the bending performance of splice connection for modular buildings. Tubular FRP members having shapes square, hexagon and rectangle are considered. The aspect ratio of splicing having bond length 170mm, 150 mm and 190 mm has been investigated. Also investigation has been carried on the splice connection FRP column assembly under axial loading and eccentric loading and pushover analysis of FRP column assembly under full scale frame. The results also show that splice connection of tubular FRP member under axial loading and eccentric loading shows more moment capacity and strength*

Key Words: Fiber reinforced polymer (FRP); Tubular section member; Splice connection; Bolted flange joint; bonded sleeve joint; Ductilitys ; ANSYS WORKBENCH 19.0

1. INTRODUCTION

The past two decades have seen increasing application of fiber reinforced polymer (FRP) composites in civil engineering structures. The use of fibre-reinforced polymer (FRP) composites for strengthening reinforced concrete (RC) structures was first investigated as an alternative to steel plate bonding for beam strengthening at the Swiss Federal Laboratory for Materials Testing and Research (EMPA). These lightweight and corrosion-proof materials have gained recognition worldwide through applications in the rehabilitation and strengthening of existing structures. Due to the moderate cost of glass fibers and advances in the pultrusion manufacturing technique , FRP composites also have great potential as load-bearing members in new construction. Examples include bridge decks, beams, columns, and floor systems.

Connection designs for these members should consider the brittle and anisotropic nature of FRP materials provided major references for FRP composite connections, primarily for plates and I- section members. Additional studies may be needed for tubular section members which have the added advantage of efficient resistance against torsional and global buckling. Various types of bolted connections have been developed and compared for FRP beam-to-column assemblies with tubular sections. In a recent study, full adhesive FRP beam-column connections were shown to be more advantageous in stiffness and moment capacity than bolted connections. Splice connections consists of a steel bolted flange joint between two tubular steel-FRP bonded sleeve joints. These splice connection to be more advantageous in stiffness and moment capacity than bolted connections. This bonded sleeve connection was later adapted for all FRP beam-to-column assemblies and evaluated under static and cyclic loadings. The steel-FRP bonded sleeve joint (BSJ) can be adapted to provide a splicing solution that is needed to apply tubular section FRP members in building structures and in long-span scenarios.

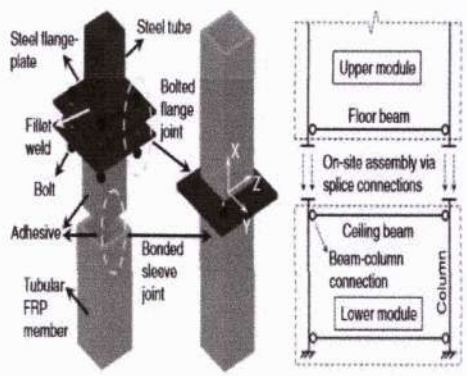

Fig 1.1: schematic representation of splice connection

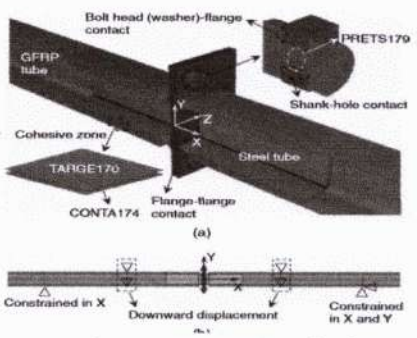

fig 1.2 : diagramatic representation of splice connection

2. SCOPE

The scope of this paper highlights the benefits of splice connection in modular buildings. We know, overall benefits of a fiber reinforced polymer includes high strength and stiffness, reduced mass, low thermal conductivity, high corrosion and weather resistance, durability, but also the

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Numerical Studies on the Shear Behaviour of Near Surface Mounted RC Deep Beams with Longitudinal Hole

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***Abstract*—Near Surface Mounting(NSM) is one of the retrofitting methods which is widely used for the strengthening of structural members. Strengthening using NSM reinforcement improves the ultimate load bearing capacity of the member. This study mainly focuses on the numerical investigation on the shear behaviour of near surface mounted reinforced concrete beam under various parameters. The study investigates the ultimate capacity of the beam with longitudinal hole and beam without longitudinal hole. The hole size adopted for the study are 50mm, 65mm,75mm and 85mm. The study concentrates the strengthening of RC deep having longitudinal hole at a position 120mm from the bottom to the centre of the hole. Both horizontal as well as inclined alignment of the NSM bar were adopted. The ultimate shear capacity of the beam with and without hole by strengthening using NSM bar in both horizontal and inclined orientations are examined under two-point loading. The capacity of the beam was maximum in the case of beam with longitudinal hole strengthened with inclined NSM.**

Keywords*—Longitudinal hole, NSM, RC deep beam, Ultimate capacity

I. INTRODUCTION

Concrete is a versatile building material which is widely used for the construction of several structural components. Generally, structures are built for transportation facility, living and other purposes. Among all the concrete structures about 80 to 90% structures will be required for the next 20 years after construction. But the structures may deteriorate because of the loss of ultimate capacity, corrosion of the reinforcement bars, etc. due to harsh environmental conditions. The environmental conditions include the temperature, humidity and exposure to salt water when the structure is at sea shore. The strengthening of these structures which are deteriorated is required for the long-life. There are many ways to strengthen the structural components of a structure such as beams columns etc. Some of the methods are section enlargement (jacketing), attaching steel plates to the surfaces of the beams, external reinforcement, fibre reinforced polymer (FRP) externally and unbounded-type strengthening techniques, steel clamping, and post-tension units.

Near Surface Mounting is a retrofitting method which is mainly applicable in reinforced concrete beams and slabs. This technique is used for the strengthening of beams by using different types of reinforcements. The reinforcement may be steel, carbon bars or carbon fiber reinforced polymer plates. This strengthening is provided by creating grooves on the surface at positive and negative moment regions of the beams and inserting the NSM reinforcement in the groove and filling by using the epoxy paste [1]. The groove should have the minimum size of 1.5 times the diameter of the NSM bar. The epoxy paste gives adequate bond between the reinforcement and the concrete. NSM reduces the mechanical damages, fire damages and vandalism. The stiffness and flexural strength of the beam can be increased by NSM method and crack width can be reduced. Fiber reinforced polymers are widely used for retrofitting using NSM method because of its promising performance. The efficiency of the NSM is very high as compared to Externally Bonded Reinforcement (EBR) method [5].

Since the concrete is very heavy, the self-weight can be reduced by providing the hole in it and this hole can be used for conveying cables of electricity, telephones etc. through it. [17,18].

NSM improves the load carrying capacity of the structural member. Normally the Near Surface Mounting methods will not take load at the beginning. So Post-tensioning technique in NSM in which the strengthening performance can be modified and it carries the load from the very begining itself [6]. For post-tensioning its good to use FRP laminates which improves the ultimate capacity by a large extent. FRP strips are also used for srengthening beams [20].

The flexural strength can be increased by Side Near Surface Mounting method on the damaged structural beam member. The SNSM method was introduced to overcome the demerits of NSM method and to increase the flexural strength and also the serviceability of the whole structure. SNSM can be done using steel and CFRP. [8,25]. Several studies were carried out under monotonic loading. Since cyclic also causes deterioration in beams in structures it should be considered. [13]. NSM method is also effective in glu-laminated timber beams. CFRP laminates are using for strengthening glulam beams [15]. Under shear strengthening the rods of NSM FRP are used for strengthening and which provides promising strength to the member [22].

For finding the shear strength contribution of the NSM FRP on RC beams, two factors should be considered. They are the constitutive law of the average-available bond-length NSM FRP strip effectively crossing the shear crack, and the maximum effective capacity it can attain during the loading process of the strengthened beam [4]. The shape of the beams also plays an important role. The ultimate capacity of the T beams strengthened with NSM were improved for an extent.

2020-21

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Predicting Performance Characteristics of Double Elliptical Micro-Strip Patch Antenna for Radiolocation Applications Using Response Surface Methodology

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Abstract—Double Elliptical Micro-strip Patch Antenna (DEMPA) is a newer family of patch antennas which possesses higher design flexibility and has greater potential for getting miniaturized than Elliptical Micro-strip Patch Antenna (EMPA). The DEMPA is made out of a Double Elliptical Patch (DEP) which is designed as a combination of two half-elliptical patches either with a common minor axis and two different semi-major axes or with a common major axis and two different semi-minor axes. There are only two design parameters for an EMPA, its semi-major axis and semi-minor axis, whereas a DEMPA has three because of either two different semi-major axes or two different semi-minor axes. A parametric study is required to understand the relationship among these three design parameters and antenna characteristics such as return loss, impedance, resonant frequency, and gain. The present work is a statistical study, using the concept of Design of Experiments (DOE), of the impact of these design parameters on the return loss at resonant frequency within the frequency band of 8.50 GHz–10.55 GHz which has been earmarked for radiolocation applications by regulating agency. The Central Composite Design (CCD) technique in the Response Surface Methodology (RSM) of DOE has been employed here to develop empirical relationship between the design parameters and response variable. Numerical models were developed using Ansoft's HFSS as per the design matrix provided by Minitab. The concept of DOE helped to establish statistically significant parametric relationship between the design parameters and antenna return loss with the minimum amount of design effort. The predictive ability of regression model was confirmed by using numerical models of two DEMPAs that were not utilized to build the empirical relationship, one among which had been fabricated, tested and reported in literature.

1. INTRODUCTION

The Micro-Strip Patch Antenna (MSPA) has applications in several fields of wireless communication such as satellite communication, mobile communication, telemedicine, radiolocation, Worldwide Interoperability for Microwave Access (WiMax) based communication, biomedical radiators, radio altimeters, mobile radio, and direct broadcast services. Antenna arrays in which patches are arranged as constitutive elements are used for Wi-Fi applications [1, 2]. In fact, MSPA is the most widely used type of printed-circuit antenna, and the other types are stripline slots and printed-circuit board dipoles and monopoles [3]. Printing dipoles or monopoles in a dielectric substrate and feeding by a micro-strip line [4] is a means for low-cost fabrication. Coming back to MSPAs, any effort in the direction of antenna miniaturization will further improve the range of its applications. In general, there are two broad ways to miniaturize MSPAs. One way is to change the material properties of its substrate so as to reduce the effective wavelength in the substrate region, and the second way is to change its shape so as to increase

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Analysis of mechanical properties and optimization of laser beam welding parameters on dissimilar metal titanium (Ti6Al4V) and aluminium (A6061) by factorial and ANOVA techniques

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Factorial & ANOVA technique
SEM
Titanium & Aluminium

ABSTRACT

The Laser Beam Welding (LBW) is done among the two different materials titanium (Ti6Al4V) and aluminium 6061. The welding is done toward twenty-seven samples to improve and approve the mechanical and metallurgical properties. This welding is completed through three sets of process parameters and three sets of values. The mechanical properties like hardness and tensile strength are estimated for the workpiece, and the ultimate value is said to 290 HV and 205 MPa, separately. The factorial structure of the examination quantifies the reaction of each conceivable blend of factors and factor levels. ANOVA technique is used to advance the procedure boundaries to achieve the ideal joint quality and nature of joints in the welded tests. Likewise, it is utilized to distinguish the utmost prevailing process parameter in this welding procedure. The three process parameters with three sets of values are welding power (1600–2000 W), welding speed (2–2.4 m/min), and offset (0.2–0.4 mm). It is evident from the SEM micrographs demonstrated that there is no fastening imperfection in the interface.

Selection and peer-review under responsibility of the scientific committee of the Second International Conference on Recent Advances in Materials and Manufacturing 2020.

1. Introduction

The utilization of lightweight structures is developing altogether in several manufacturing divisions like aviation, defence, and automotive industries demand great solidarity to weight proportion is accomplished in the fastening procedure among titanium and aluminium amalgams. The investigation has been done in these divisions in creating different welding strategies to deliver prominent strength and minimal weight parts. The thermal welding of Ti/Al unique composites is a confront on account of considerable distinctions in physical–chemical properties among Ti and Al [1–3].

Be that as it may, the utilization of lightweight materials becomes challenging when two various types should be incorporated and associated. The association of different materials like Al (A6061) and Ti (Ti6Al4V) can be acknowledged by riveting, press-joining, and screwing. These are as yet generally utilized methods in the automobile and aviation businesses. An option for fastening titanium and aluminium is the utilization of laser frameworks like Nd: YAG or CO2 to acknowledge welds with superb properties. Be that as it may, the fundamental viewpoint during the fastening of aluminium to titanium is the development of intermetallic stages, which rely upon process associated temperature–time cycles. The butt joint procedure utilizes a brazing procedure in blend with a welding procedure to understand an association between unique materials. The laser should be situated in the titanium-aluminium process, ideally on the titanium sheet [4,5].

In this examination, the two unique materials, for example, titanium (Ti6Al4V) and aluminium 6061, have been welded through the Laser beam welding process. Altogether, twenty-seven samples are set up according to the detail for this welding procedure. The mechanical properties like hardness value and tensile strength are estimated for all the welded specimens to assess the ideal seam quality and nature of the weld seams. In this LBW procedure, three process parameters have taken, for example, Laser power (W), welding speed (m/min), and offset (mm). Three levels of values have been given during the procedure. Factorial (DOE) strategy is utilized to recognize conceivable factors and factor levels. ANOVA is utilized to look at the most affecting process parameter in acquiring the highest tensile and hardness value and get the whole

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ORIGINAL CONTRIBUTION

Investigation on Post-Weld Heat Treated Titanium-Aluminum Dissimilar Laser Welded Joint

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Abstract The influence of post-weld heat treatment on the mechanical properties and microstructure of Ti/Al laser welded joints was studied, which included solution treatment and artificial aging treatment. A concerted heat source is provided by the laser beam, allowing higher, deeper welding and narrower rates of speeds. Laser beam welding of titanium and aluminum alloy is required for aviation and automobile firms because of its better strength and lightweight. The presented work is carried out at two stages: (a) Laser beam welding of 2 mm thickness A6061 and Ti6Al4V butt seams was done by moving a laser source on the top side of the Ti sheet and finding optimum power, speed and offset that provides higher tensile strength and hardness and (b) post-weld heat treatment (550 °C * 15 min quenching + 200 °C * 15 min aging). From the outcomes, it is seen that laser beam centering from the titanium part gives a very much advanced age solidified pattern, and EDS uncovers that the joint is a metallurgical one. The post-weld heat treatment promotes strength for the fabric over 29%, and laser welding is reasonable for distinct alloy joining. All of these experimental results demonstrate the formation of uniform microstructure in the weld region along with a remarkable enhancement in mechanical properties for the weld region which surpasses the parent material.

Keywords Laser beam welding · Titanium · Aluminum · Heat treatment · Microstructure · EDS

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Abbreviations

LBW	Laser beam welding
Al	Aluminum
Ti	Titanium
EDS	Energy-dispersive spectroscopy
SEM	Scanning electron microscope
FZ	Fusion zone
HAZ	Heat affected zone
UTM	Universal testing machine
EDM	Electric dischzrge machine
PWHT	Post-weld heat treatment
HT	Heat treatment
ASTM	American Society for Testing and Materials

Introduction

Welding is a well-accepted method in manufacturing industries. Both solid state and fusion welding can be used to produce various products and materials. There is an undeniable influence of the laser on these strategies for combining metals. Laser beam welding is more advanced than other welding techniques, particularly in welding of titanium alloys. This is because of its high degree of flexibility and density. Temper the weld beads to build ductility and hardness [1]. The push for improved, lightweight and high-quality assemblies and a simultaneous focus on all tasks can be observed in multi-material crossovers [2]. Dissimilar Ti/Al joints can give application focused arrangements in numerous cutting edge producing businesses. For example, aircraft, aerospace, nuclear and chemical industries, which can decrease weight and expense (because of Al alloy) and advance quality, erosion

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Soft Storey Mitigation Behaviour of Combined Hexa, Octa and Penta Bracing System

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Abstract - *The greatest challenge for structural engineer is to design the structure to be earthquake resistant. When a structure is designed for seismic resistance, various systems are embedded into structure so as to resist the lateral force. One of the systems adopted for resisting lateral forces, is to provide the structure with different types of bracings. There are many conventional types of bracings. Bracing is the best method to overcome soft storey effect. In this project a combined Hexa, Octa and Penta bracing system is investigated. An innovative bracing system is introduced in a G+20 building with soft storey to improve its seismic performance. G+20 building with different bracing configurations are analysed to check soft storey mitigation behaviour. To study linear and nonlinear behaviour of structure, dynamic analysis and push over analysis are performed. ETABS is used for modelling and analysing the building in this project.*

Key Words: **Bracing system, Dynamic analysis, Push over analysis, Soft storey, ETABS.**

1. INTRODUCTION

Steel structures generally need less construction time, have larger span feasibility and have better seismic resistance than reinforced concrete structures, and thereby popularity of steel structures are increasing nowadays. A Soft storey is defined as the storey in a building structure which has substantially less resistance, or stiffness, than the storeys above or below it. It has inadequate shear resistance and inadequate ductility to resist the earthquake – induced building stress. A Soft storey is one within which the lateral stiffness is smaller than 70% of storey above or less than 80% of the average lateral stiffness of the three storeys above, as per IS 1893:2002. Soft storeys may be located at top, bottom or intermediate points, so that the floor above or below may become stiffer compared to itself. In order to reduce lateral deflection, a bracing system is introduced in the structure. Bracings increase the stability of the structure by transferring lateral load sideways down to the ground and thereby preventing sway of the structure. In Seismic design of structure and in high rise structure, the provision of bracing system makes them more effective. In this project a combined Hexa, Octa and Penta bracing is introduced as shown in Fig 1, Fig 2 and Fig 3 respectively. The Main aim of the present study is to know the effect of bracings on soft storey multi-storied building. The project aims to study the overall performance of the building which different size of bracing system. Also to identify the suitable bracing system for resisting the seismic load efficiently. The simple parameters to determine the stiffness of frames are storey displacement, storey drift and storey shear. Storey displacement is defined as the displacement of a storey with respect to the base of the structure. Storey drift is the lateral displacement of one level of multi-storied building relative to the level below. The Seismic force applied at each floor level is defined as storey shear. Bracings are economical method to laterally stiffen the framed structures against wind and gravity loads. As the trend of construction of tall buildings is increasing, it is utmost importance to find cost effective bracing system.

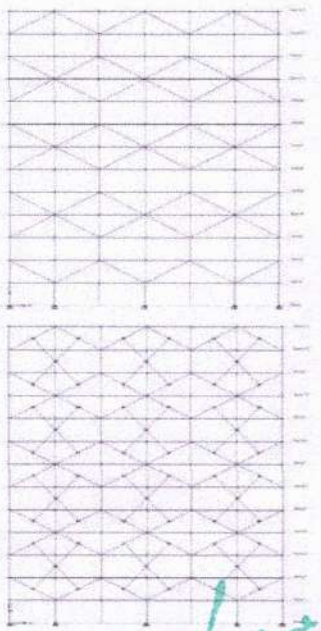

Fig-1: Elevation of Hexa, **Fig-2:** Elevation of Penta

Est. 2003

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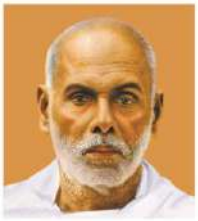

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Approaching Bus Driver Collapse Exposure Entity Situated upon Rumbustious Observable Inquiry as Concerns Eye Eventuality

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Abstract: ***Drivers exhaustion is one in ensemble effective ultimate considerable causation away from service collision, decidedly considering operator based on immense transport. Recommend a perceiving situated exhaustion exposure entity con- sidering indigene monitoring, whatever endure straightforward including versatile considering organization trendy integrate including enormous automobile. Effective entity repose based on section containing head-shoulder exposure, face exposure, eye pair exposure, eye observance appraisal, indolence frequency percent based on eyelift desistance appraisal, mouth exposure, as a consequence exhaustion level apportionment. A study measure of Eye Closure's Percentage on effective continual surface of eye observance endure specify, and therefore the operator states are classified on that. In venture, complete evaluations moreover investigation connected with contemplated algorithms, similarly as measuring with ground truth on Eye Closure's Percentage computation endure achieve. Impressive experimental repercus- sion show effective benefits of the entity on accuracy along with stableness as long as expressive investigate latitude immediately upon a camera of an sloping observe angle to effective drivers face endure employed considering energetic elucidate supervise.***

Index Terms: Machine Learning, exhaustion exposure, Eye clo- sure's percentage.

I. INTRODUCTION

In contemporary senescence, driver apathy has been one throughout affecting necessary causes of roadway collision moreover efficiency inducement severe physical fracture, deaths including indicative economic deprivation [1]. Various process endure included by whatever efective immobility are often detected and warning are often issued to the motive force while driving. Exhaustion,apathy as well as somnolence are often pre-owned conformably in driving state portraiture. Instant, more and more professions desire long term deliberation [2]. Drivers must keep a detailed eye held effective roadway, so a certain they can operate to sudden events immediately. Driver exhaustion often becomes a right away explanation for many transportation collision. Therefore, there's a desire to develop the entity which will observe furthermore convey a operator of her/him bad psychophysical inure, whatever put up compulsorily depreciate effective amount based on exhaustion correspondent car collision. However, effective event connected with comparable entity encounters many predicament associated with agile moreover legitimate understanding based on a drivers exhaustion expression. Solitary in all effective technical possibilities to contrivance operator apathy exposure [3] entity is to use the vision based approach.

Driving may be a complicated effort effective desires physical resources furthermore as immaterial alertness. Effective necessity connected with adequate immaterial attentiveness assemble it a uncertain work considering creature possess restricted competence to be conscientious for long supply of extent. Deficit about contemplation, preoccupancy, and/or somnolence will cause serious supreme deformation as well as deprivation of life considering sightseer as well as operator and traveler [5]. Attendant square measure plenty influence ramified trendy pathway collision such as weather, pathway condition, transport condition, operator engrossment, operator energetic skills and temporary state. The imperative connected with temporary state is usually remarked as languor, and that suggests that the operator options a bent to decline dozing. A dreamy operator pedantry variety based on expression, inclusive of recurring eye-closure, rapid as well as stabile glimmer, sleepyhead or swinging head, moreover revisit snooze [6]. within the finale decennium, multitudinous perception entity are advanced to recognize comparable behaviors of apathy considering impellent refuge. Highest of effective present entity desire effective installment of a camera straight toward effective drivers face toward appropriating high resolution face picture, moreover a few of them employ specifically designed infra-red cameras, or stereo cameras [7]. Affecting view algorithms endure perform for high purposefulness facing view face as well as eye picture. This configuration isn't applicable for buses and huge conveyance. Abusmostly features a large front glasswindowto let the

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Original Research Paper

Engineering

PI CONTROL BASED ENERGY MANAGEMENT STRATEGY OF BATTERY/ULTRACAPACITOR HYBRID ELECTRIC VEHICLES

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ABSTRACT Hybrid electric vehicles have gained attention throughout due to its advantage of green technology and reduced greenhouse gases emission. More over, hybrid vehicles being powered by battery would be the best option of replacing current petrol or gas dependent vehicles. There are drawbacks also; battery has limited lifetime and is very costly. Hence, it is hybridized with other energy storage systems such as ultracapacitor. This work focuses on the energy management system for the energy storage system consisting battery and ultracapacitor of a hybrid electric vehicle using adaptive fuzzy logic based controller. This energy management system manages energy feed between battery and ultracapacitor. Simulation environment chosen is Matlab/Simulink.

KEYWORDS : Ultracapacitor-PI Controller-Energy Management system-Bidirectional Converter-Battery

INTRODUCTION

In recent years, global warming and water-related issues have warned that in many developed countries. It is important to reduce fuel consumption. Particularly focusing on automotive technology (that is fuel-efficient) in order to reduce the threat of global warming and energy issues. Few well-known technologies are hybrid electric vehicles (HEV) and full electric vehicle (FEV). Other researchers are working to improve the fuel efficient transport technology which provides internal combustion engines with power supply, power recovery systems, super capacitors, and efficient management of energy management.

All of them use a battery pack to supplement conventional ICEs. It is believed that such HEVs are only the intermediate products between conventional ICE vehicles and battery electric vehicles (BEVs, which use batteries as the primary energy source without ICEs). With the rapid development of battery technologies, lithium-ion batteries today have reasonable energy density compared with other types of batteries but become much cheaper. It is possible to utilize them as the primary energy storage component for automotive applications. On the other hand, a possible solution may be to select another energy storage component, ultracapacitor (UC), to assist batteries, forming a hybrid energy storage system (HESS) for EVs. UCs have high power density, long cycle life, quick dynamic response but low energy density, which are opposite towards batteries[3]. So the combination of them is anticipated to Complement one another.

LITERATURE RIVEW

Parallel Hybrid Electric Vehicle Configuration

The parallel HEV allows both ICE and electric motor (EM) to deliver power to drive the wheels. Since both the ICE and EM are coupled to the drive shaft of the wheels via two clutches, the propulsion power may be supplied by ICE alone, by EM only or by both ICE and EM. The EM can be used as a generator to charge the battery by regenerative braking or absorbing power from the ICE when its output is greater than that required to drive the wheels.

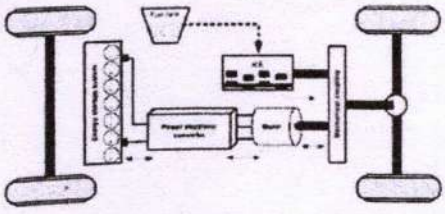

Figure 1: Parallel Hybrid Electric Vehicle Configuration

Battery/Ultracapacitor Energy Storage System

The efficiency of electric vehicles (EV) and hybrid electric vehicles (HEV) depends on their capability to store large amounts of energy, and also to quickly extract power from that energy. Currently, HEV rely on large battery systems to store their on-board electrical energy In order to meet the peak power demands, battery storage systems tend to be oversized and heavy.

This hybrid energy storage system (HESS) can be either passively or actively connected and both topologies will be considered in this work. The simplest of the configurations is the passively connected system. This is comprised of the ultracapacitor directly connected, in parallel to the battery. This configuration limits the control over the charge and discharge of the components. The voltage and state of charge (SOC) of each

SYSTEM MODELING

Figure 2 shows complete block diagram representation of Hybrid Energy Storage System of HEV. Each and every components are modelled separately by means of mathematical equations. The simulation environment is chosen here as Matlab/Simulink.

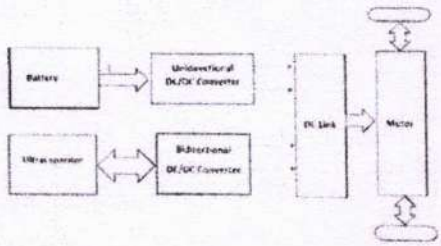

Figure 2: System configuration

Battery Model

The battery model is given by set of equations. The proposed model represents a non-linear voltage which depends uniquely on the actual battery charge [6]. The battery is modelled using a simple controlled voltage source in series with a constant resistance, as shown in Fig bellow.

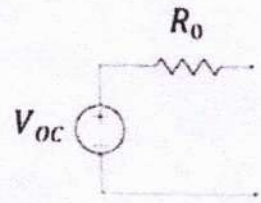

Figure 3: Battery Model

Ultracapacitor Model

Ultracapacitor should assist the battery by handling the momentary peaks in power. Due to relatively low internal resistance, it can

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Experimental Investigation on Use of Cockle Shell as Partial Coarse Aggregate Replacement in Concrete

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Abstract— *Preserving natural coarse aggregate for future generation and reducing cockle shell waste has initiated studies on possibility of integrating this waste in concrete production. The main of this research work is to encourage the use of waste products such as cockle shell construction materials in low-cost building. In this research study an experimental investigation was conducted on varying percentages of (0%, 7%, 14%, 21%, and 28%) cockle shell as coarse aggregate replacement for M20 grade of concrete to produce an environment friendly concrete. Tests were conducted to analyse the properties of materials used in concrete. Properties of fresh and hardened concrete were obtained by workability test, strength test, durability test and non-destructive test (NDT). The optimum percentage of replacement of cockle shell as coarse aggregate in M20 grade of concrete was obtained as 21%. The results of the research work show that cockle shell is an effective alternative for partial replacement of coarse aggregate in concrete, which may produce workable and eco-friendly concrete with high strength on optimum percentage of replacement.*

Keywords— *Concrete, Cockleshell, Strength test, Workability, Durability, Non destructive test.*

I. INTRODUCTION

The increase in construction works in the country has increased demand for the construction materials. The insufficiency of the conventional construction materials such as granites, sand, cement etc increases the demand of these construction materials. This increases cost of constructions such as buildings, roads, pavements etc. It is very necessary to make meaningful efforts to save the nation from the housing problem. Scientists, engineers and technologists are continuously are searching for the materials, which can act as substitute for conventional materials in concrete and possess the required properties leads to reduction in the cost of construction.

The growing construction industry had caused the destruction of natural aggregates. The natural sources of aggregates will soon decrease. Aggregates are obtained from two primary sources, viz. quarries and river beds. Environmental issues occur when there is extraction of sand and gravel. The aggregate extraction and processing are the principal causes of environmental problems.

The need for replacement of natural aggregates is a growing requirement to meet the demand for aggregates in concrete. Recent studies aim on the locally available waste to be used as aggregates instead of natural aggregate materials. Such a waste is the seashells obtained from coastal areas, freshwater lakes and riverine areas. Recent investigation of sea shells has indicated greater scope for their utilization as a replacement to cement and aggregate in concrete. Cockleshell is a hard, protective layer, a calcareous exoskeleton which supports and protects the soft parts of an animal. As they grow old, the shells increase in size which becomes a strong compact casing for the mollusc inside. The hard shells are regarded as waste material, which are accumulated in many parts of the country, when dumped and left untreated may cause unpleasant smell .Cockle shell as one of the mixing ingredient in concrete production thus opening a new innovation in concrete research and at the same time offering. Therefore cockle shells are a viable option as partial replacement to coarse aggregate because they contain a large amount of calcium carbonate. Also the calcium carbonate can help improve resistance against heat and chemicals. Cockle shell obtained from dumbing site are washed and cleaned before use as shown in fig. 1. The partial replacement of coarse aggregate with cockle in concrete mix potentially reduces the cost of constructions and makes the concrete industry more environmentally sustainable.

Fig. 1. Washed and cleaned cockle shell

II. OBJECTIVES AND SCOPE OF STUDY

The main objectives of this research work are listed below

- To evaluate the possibility of reducing the quantity of natural coarse aggregate in concrete by partial replacement of coarse aggregate with cockle shell.

Raseela M K P and B. Mary Sonia George, "Experimental Investigation on Use of Cockle Shell as Partial Coarse Aggregate Replacement in Concrete," *International Research Journal of Advanced Engineering and Science*, Volume 4, Issue 2, pp. 504-510, 2019.

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Double-Elliptical Micro-Strip Patch Antenna for Higher Design Flexibility and Miniaturization

Jerry V. Jose, A. Shobha Rekh, Jose M.J.

Abstract – Micro-Strip Patch Antenna (MSPA) finds large scale applications in various fields of communication. Elliptical shaped patch antenna is a prominent category among MSPAs. Possibility of circular polarization and dual resonant frequencies makes the Elliptical Micro-strip Patch Antenna (EMPA) widely accepted in modern communication devices. The present work aims to identify the constraints in further advancements in the design of EMPA and propose a novel shape to overcome these constraints. Minimizing the patch area and increasing the number of degrees of freedom in design were found to be the challenges. To overcome these challenges, a newly shaped patch called 'Double-Elliptical Patch (DEP)' is proposed for designing 'Double-Elliptical Micro-strip Patch Antenna (DEMPA)'. A double-ellipse is a combination of two half-ellipses either with the same minor axis and different semi-major axes or with the same major axis and different semi-minor axes. The DEP has an additional degree of freedom in design compared to elliptical patch, which leads to greater design flexibility. In the present work, a DEP with the same horizontal major axis and centrally given feed was designed using Ansoft HFSS software. The semi-minor axis of upper half-ellipse was varied by keeping the semi-minor axis of lower half-ellipse a constant. The radiation properties of DEMPA were found to be similar to that of corresponding EMPA and this was achieved with less patch area. The maximum percentage reduction in patch area was 10.714%. The DEMPA covered the entire frequency range of Ultra Wide Band (UWB).

Keywords: Double-elliptical, Elliptical, Micro-strip patch antenna, UWB, Miniaturization

I. INTRODUCTION

Micro-Strip Patch Antennas (MSPAs) are designed and fabricated in various regular geometric shapes such as rectangular, circular, triangular and elliptical. The possibility of attaining circular polarization with a single feed and dual resonant frequencies makes Elliptical Micro-strip Patch Antenna (EMPA) a prominent category among them [1]. The EMPA was found to have a wider frequency band of operation than the circular one [2]. Also, the eccentricity of elliptical patch was considered to be an additional degree of freedom that provided more design flexibility to antenna. The antenna miniaturization techniques and ways of attaining higher flexibility in antenna design are much needed for the further advancement of research in EMPA.

The geometric shape of patch is highly significant in deciding the design flexibility and achieving miniaturization in the case of MSPA. Hence, several variations of the elliptical shape were tried by the researchers so far. Elliptical patch with circular slots at different locations was designed [3]. An elliptical patch in which two sectors were carved out from its bottom half was used to fabricate a UWB antenna [4]. A hybrid patch antenna was made out of hybrid trapezoidal-elliptical patch [5]. The Lorentz fractal shape was introduced on ellipse to form a compact fractal elliptical patch antenna [6]. Two ellipses were joined at 45^0 to attain such a shape. Performance of EMPA could be improved by inserting slots of different shape and size on elliptical patch. This was proved to be a good approach to minimize the patch area. For L-band and S-band applications, circular slotted elliptical patch antenna with an elliptical notch in ground was fabricated [7]. Inclusion of orthogonal sector slots in elliptical patch was found to be reducing the effective patch area [8]. Two such slots were arranged opposite to each other along the major axis and the third slot was inserted along minor axis. By removing a circular disc from an elliptical patch, a crescent shaped patch antenna was designed and fabricated [9]. Combination of two planar antennas, one was made by creating an elliptical slot within an elliptical patch and the other one was made as an elliptical patch within the space of this elliptical slot, was designed for UWB applications [10]. An elliptical patch in which a narrow slot was introduced along the major axis about half way was developed for UWB applications [11]. A semi-elliptical patch antenna with a semi-circular ring slot was fabricated for WiMax applications [12]. Confocal elliptical annular ring MSPA was also proposed [13]. The above shape variations were proposed with respect to the basic elliptical shape. They were only the modifications of ellipse and hence had limitations to get improved further.

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Double-Elliptical Shaped Miniaturized Microstrip Patch Antenna for Ultra-Wide Band Applications

Jerry V. Jose[1, *], Aruldas S. Rekh[1], and Manayanickal J. Jose[2]

Abstract—Greater design flexibility and newer miniaturization techniques are highly sought after by the commercial antenna industry and researchers. Micro-Strip Patch Antenna (MSPA) is finding huge applications in various fields of communication. In the present paper, the novel idea of Double-Elliptical Micro-strip Patch Antenna (DEMPA) is proposed for antenna miniaturization and higher design flexibility. Double-Elliptical Patch (DEP) is made as the combination of two half-elliptical patches having the same minor axis and different semi-major axes or the same major axis and different semi-minor axes. A DEP with different lengths of horizontally arranged semi-major axes and centrally given feed was considered here. The length of semi-major axis for right half-elliptical patch was varied while keeping the length of semi-major axis for left half-elliptical patch fixed. Design of DEMPA was carried out using Ansoft HFSS software, and the antenna has been fabricated and tested. The measured results were in good agreement with the simulated ones. The percentage reduction in effective patch area was found to be 8.33 for DEMPA compared to the corresponding elliptical patch antenna. The DEMPA covered the entire frequency range of Ultra Wide Band (UWB). With this novel shape, greater design flexibility along with miniaturization is achieved. The axial ratio analysis showed that the resulted antenna was of linear polarization.

1. INTRODUCTION

Micro-Strip Patch Antenna (MSPA) finds immense applications in the fields of Global Positioning System (GPS), mobile and satellite communications, Radio Frequency Identification (RFID), radar communications, telemedicine, radiolocation services, holographic antennas, Wireless Local Area Network (WLAN), and many more. Apart from being inexpensive, easy to manufacture, light in weight, of thinner profile, and capable of producing linear and circular polarizations, the MSPAs can be made of practically any shape. The performance parameters of MSPAs may be largely varied by adopting different shapes for them. Most popular shapes for MSPAs are the basic regular geometric shapes such as rectangle, circle, triangle, and ellipse and their variants. Patches are also made of fractals which are never ending and self-similar patterns that repeat themselves at different scales.

Out of the regular geometric shapes, Elliptical Micro-strip Patch Antenna (EMPA) is the least explored one because of the complexity involved in its design due to the presence of Mathieu and Bessel functions. EMPAs are able to generate circular polarizations with only a single feed arranged along a radial line inclined at $\pm 45°$ to its major axis [1] while the rectangular MSPAs need multiple feeds or substantial shape variations to develop circular polarization. Another important advantage of EMPA is the dual resonant frequencies of the dominant even and odd modes [2]. The design flexibility of EMPA is better because of a higher degree of freedom due to eccentricity which is defined as the ratio of semi-minor axis to semi-major axis of ellipse. For a circle, the eccentricity is one and it varies between

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Design Techniques for Elliptical Micro-Strip Patch Antenna and Their Effects on Antenna Performance

Jerry V. Jose, A. Shobha Rekh, Jose M.J.

Abstract: ***Elliptical Micro-strip Patch Antenna (EMPA) has been emerged as a peculiar and significant category among the different shaped micro-strip patch antennas because of its circular polarization and dual-resonant frequency features with a single feed. Elliptical and its derived shapes such as semi-elliptical, half-elliptical, slotted-elliptical and elliptical ring are found to be particularly instrumental for bandwidth enhancement and these antennas find great applications in Ultra Wide Band (UWB) and Super Wide Band (SWB) communications. Compared to antennas with circular or rectangular shapes, the design of EMPA is a research area of high potential as there is higher flexibility in its design due to more degrees of freedom. The reported literature in the field of EMPA is very less and there is ample scope for new researchers to work on. This review paper is an attempt to summarize and critically assess the-state-of-the-art design techniques as reported in literature and understand their effects on performance of elliptical patch antenna for suggesting new research fronts in the field of EMPA.***

Keywords – Elliptical Micro-strip Patch Antenna, Circular polarization, Eccentricity, UWB.

I. INTRODUCTION

Circular polarization and dual resonant frequencies are required in many real time applications such as radar, communication, telecommunication and navigation systems. For wireless applications, the circular polarization can be achieved by varying the shape of or by the use of multiple feeds for rectangular micro-strip patch antenna. But, with the help of only a single feed, circular polarization can be achieved for an elliptical patch antenna which is fed along a radial line inclined at $\pm 45^0$ to its major axis [1]. The positive sign yields Left-Hand Circularly Polarized (LHCP) wave and the negative sign yields Right-Hand Circularly Polarized (RHCP) wave. For EMPA with small values of eccentricity, left-hand or right-hand circular polarization may be achieved in a narrow frequency band and the currents, internal fields and radiated fields of antenna are expressed in terms of Mathieu Functions. A theoretical study was conducted to calculate the dual-resonant frequency of the dominant even and odd modes and for predicting the existence of circular polarizations of EMPAs [2].

A simple resonant circuit model was developed to predict the input impedance of an EMPA and this model was used to determine the impedance and bandwidth as a function of the size, eccentricity and thickness of the radiator [3]. A more accurate and simple technique to calculate the resonant frequency of dominant even and odd modes of elliptical patch antennas was discussed [4]. The even mode was found to have a low value of bandwidth when the eccentricity was large. Also, it was observed that the even mode had a broader radiation pattern with a lower level of cross-polarization in comparison with the odd mode. A better approach that could determine resonant frequencies of EMPA more closer to experimental values was proposed [5]. Also, elliptical structure is said to have a wider frequency band of operation than the circular one. Eccentricity value was listed as an additional degree of freedom [6]. Method of Moments (MoM) along with the reaction integration method was employed to analyze the EMPA for circular polarization where the continuity and singularity of the currents in the patch-probe conjunction point was ensured using the attachment mode [7]. A model to predict the dual resonant frequencies of an elliptical patch micro-strip printed on isotropic or anisotropic substrate was developed [8]. An analytical approach was presented for the characterization of metasurfaces consisting of elliptical patches printed on grounded dielectric slab [9]. The behavior of radiated fields and impedance of elliptical radiator as a function of frequency, eccentricity and dielectric thickness was investigated through an experimental study [10]. The eccentricity was varied from 1.00 to 0.96 for five different ellipses for two different thicknesses of printed circuit board. The antenna which produced the best circular polarization was having an eccentricity value of 0.976.

The EMPA finds immense applications in Wireless Local Area Network (WLAN) [11][12], Ultra Wide Band (UWB) communications [13][14][15][16][17][18][19], GPS (1.57-1.58 GHz) [14][20], GSM1800 (1.71-1.88) GHz, PCS1900 (1.93-1.99) GHz, Multi-band GNNS [14], WiMax communication systems [21], Microwave communications [22], L-band and S-band communications [23][24], Super Wide Band (SWB) communications [25][26], Ultra High Frequency (UHF) band communications, GSM900, Radio Frequency Identification (RFID) band communications [27], mobile satellite service, radio astronomy, amateur radio services, C-band communications, X-band communications [28], radiolocation (8.50-10.55 GHz) services [29] and holographic antennas [9].

The enormous applications of EMPAs demand faster development of design techniques which requires greater efforts from scientific community.

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Laser beam welding: research state of the art on performance and measures*

by

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Abstract: Laser beam welding (LBW) is a remarkable method for combining dissimilar materials, primarily when the unique amalgamation of metals is necessary. LBW, owing to attractive features, namely: low heat input, high heat concentration, high power density and low distortion is one of the more advantageous methods for, e.g., welding and repair of aircraft and turbine engine elements, constructed from superalloy. In this paper, the literature is scrutinized on diverse techniques that are associated with laser welding systems. The review is provided of several dozen research articles, involving an appropriate analysis. Initially, the analysis depicts various schemes that are contributed in different articles. Subsequently, the analysis also focuses on various particular features such as laser beam width and type of laser, and it also considers the heat treatment analysis that is contained in each of the articles reviewed. Furthermore, the present paper provides a detailed study regarding the performance measures and maximum performance achievements regarding each contribution accounted for. Finally, it indicates the various research issues, which can be useful for the researchers to carry out further research on laser welding systems. Of particular interest to the Readers of this journal is the fact of ample application of modelling, identification, data processing, image processing and AI tools in the respective surveyed studies.

Keywords: laser welding; beam width; heat treatment; performance measures; maximum performance

1. Introduction

Modern industries, namely such as automotive, aeronautics, and power production require products with high performance, incorporating an enlarged count of functions and features, involving, in particular, recyclability and lightweight, while warranting effectiveness and flexibility (Lee et al., 2015; Dhivyasri et al.,

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A Review - Studies on Heat Treatment of Laser Beam Welded Ti, /Al Dissimilar Sheet Metals

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Abstract--- Post weld heat treatment is used to ensure the material strength of a part is retained after welding. It consists of solution heat treatment and precipitation or ageing treatment. Laser beam welding is capable of Titanium-Aluminium welding which is having larger claims in aerospace, aircraft, automotive, electronics and other industries. The purpose of this work is to study the effect of Post Weld Heat Treatment on the micro structural and strength properties and welding parameters of Laser beam welded Titanium (Ti6Al4V)-Aluminium (A6061) dissimilar sheet metals. This paper reviews the basic concepts associated with Role of post weld heat treatment and different parameters of Ti/Al sheet joint using Laser beam welding.

Keywords--- Aluminium and Titanium Sheets, Dissimilar Joining, Laser Beam Welding, Post Weld Heat Treatment.

I. Introduction

Modern industries such as aeronautics, automotive, and power generation call for high performance products, which integrate an increased number of functions and properties like lightweight and recyclability and warrant efficiency and versatility. As one single material fails often to meet those requirements, a combination of two or more materials can satisfy a specific need of those industries[1], [2].Joining processes are largely exploited in manufacturing traditional and innovative products. Welding is very popular in the manufacturing industry. Both fusion and solid state welding are used for a variety of materials and products[3]. Among fusion welding techniques, the laser has gained a prominent position as an autogeneous fusing source for metals joining[4].Laser welding for dissimilar titanium and aluminium alloys is a new area, which is having wider applications in aerospace, aircraft, automotive, electronics and other industries[5].

Laser welding can provide a significant benefit for the welding of Titanium (Ti6Al4V) and Aluminium (A6061) thin sheets with precision and rapid processing capability[1]. The great potentiality in aircraft and automotive industries, dissimilar joining of Al-Ti structures is often challenging because of the unavoidable formation of brittle intermetallic compounds, mixing of molten phases, and significant differences in material properties[5]. Laser beam welding is still a challenge to achieve satisfactory weld joints in Ti and Al alloy dissimilar thin sheets. Distortion is a common phenomenon in welding and is normally controlled by using welding jig[6].

The particular aim of present work is to investigate the effect of heat treatment on the microstructure and improvement of mechanical and corrosion properties of Ti-Al laser beam welded dissimilar joint. Post Weld Heat Treatment is one type of heat treatment process applied to welded joints after completion of the welding process to improve mechanical properties and reduce the brittle fracture of welded joints by changing the metallurgical structure.

1.1 Laser welding

The Laser (Light amplification by stimulated emission of radiation) is a concentrated beam of coherent monochromatic radiation as shown in fig1[7]. The laser is generally recognized as being a high power density heat sourcein welding technology, high-speed welding and single-pass deep penetration welding. Due to the extremely narrow bead width, thermal distortion and heat effect produced by welding can be substantially reduced. Laser welding as an important characteristic also affords better controllability than conventional welding methods[8].

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