3.3.2 Number of books and chapters in edited volumes/books published and papers published in national/ international conference proceedings per teacher during last five year

Sl. No.	Name of the teacher	Title of the book/chapters published	Title of the paper	Name of the conference	Calendar Year of publication
2022-23					
1	Dr.Bharath P B	Advanced Trends in Mechanical & Automation Science	Thermal conductivity and resistivity of 3-D printed carbon fiber reinforced polyamide composites	2nd International Conference on Advanced Trends in Mechanical & Automation Science	2023
2	Dr. Siddesh K B	Recent trends in Technology and Innnovation	Desing and analysis of topologically compressed flip flop with maximum power saving	ICEI-2023	2023
3	Prof. Farzana Parveen B A	Advnaces in Computing ,Cintrol and Telecommunication Technology-	Analysis of value stream mapping frame work with machine learning technique	ACT 2023	2023
4	Prof. Chetan S	Recent trends on VLSI, Communications and Computer Communication	A Performance Assessment of a Slotted Reconfigured Microstrip Patch Antenna for MultiWireless Applications	International Conference on VLSI, Communications and Computer Communication	2023

5	Prof Basantha Kumari	Innovations ,challenges and optimisation	Strengthening Forest Conservation with an IoT-Based Anti-Poaching Alarm System for Treess	IC-ICIC	2023
6	Dr. Jagannatha N	Advanced Trends in Mechanical Automation	Investigation of laser abrasive jet machining of soda lime glass	(ATMA-2023)	2022
7	Dr. Jagannatha N	Advanced Trends in Mechanical Engineering	Tribological Study on Effect of Chill Casting on Aluminium A356 Reinforced with Hematite Paticulated Composites	ICRDME – 2022 Conference Proceedings	2022
8	Dr.Manjunatha S C	Engineering and Innovations	GA based POD and GADC based voltage regulator for IPFC to dampen low frequency oscillation	ICEI-22	2022
9	Dr.Manjunatha S C	Next Generation Integllence and Technology	Detection of skin cancer using artificial intelligence and Machine learning concepts	IEEE	2022
10	Dr. Srishaila J M	Innovations,opportunities and challenges	An Experimental Investigation on Lego Blocks Using Industrial and Agricultural Waste	Sustainable Infrastructure : Innovations, Opportunities and Challenges (SIIOC 2023)	2022
11	Prof Avinash G M	Engineering and Innovations	Journal : Sensor based soil nutrient monitoring in agriculture	Journal of JILIN University, China	2022

2021-22					
13	Dr.Rajesh A M, Dr.Bharath P B Prof., Prabhuswamy G S, ,Dr.Shivakumar S P	Enginnering Innovations and Technology	Experimental Investigation and Processing of Aluminium with Silicon Carbide and Graphite Particulates	ICEI-2022	2022
14	Dr.Manjunatha S C Mrs.Sudha T Mr.Sanjay Kumar K Mr.Raghu S	Engineering Innovations	Bluetooth control pick and place Robot using Arduino	International conference on Engineering Innovation	2022
15	Mr.Maruthi naik R K, Mr.Chandrashekhar R K, Mr.Sanjay Kumar K, Mr.Raghu S	Engineering Innovation	Fire Fighting Robot with a Voice	International conference on Engineering Innovation	2022
16	Pramod P S	Advanced materials in Engineering Innovation	Comparative study on Collision effect using Response Spectrum Analysis	IJIRSET	2022
17	Hussain Imran K M	Advanced materials in Engineering Innovation	Comparative Analysis of RCC structures	IRJET	2022
18	Shankar G S	Advanced materials in Engineering Innovation	Structural Analysis of Assymetrical multistory building with water tank as FVD	IJIRSET	2022

19	Dr. Satish J	Engineering Innovations and sciences	Studies on high temperature wear behavior of magnesium metal matrix composites	IJIRSET.2021	2021
20	Prof. Chetan S	Next Generation Integllence and Technology	A Compact Meta material inspired triple band monopole antenna for wireless applications	NGIEC	2021
21	Prof. Chetan S	Next Generation Integllence and Technology	Design and development of frequency reconfigurable microstrip planar monopole antenna	NGIEC	2021
2020-21					
22	Prof. Ramesh B E	Engineering Science and Computing	Cyber Attack Detection and notifying system using ML techniques	International Journal of Engineering Science and Computing	2021
23	Prof. Ramesh B E	An automated facemask and social distance evaluation system using AWS	ICEAASET -2021	Engineering	2021
24	Dr. Kumara swamy BG	Advances in Physical Sciencesand Materials (ICAPSM 2021)	A Analytical Study of Wind Speed Distribution at Government First Grade College Premises in Hosadurga, India	Advances in Physical Sciencesand Materials (ICAPSM 2021)	2021
25	Dr. Kumara swamy B G	Recent Developments in Computer andCommunication Technology (GC-RDCT 2021)	Selection of an Efficient Wind Turbine Generator at Government Science College Premises Chitradurga, India	Recent Developments in Computer and Communication Technology (GC-RDCT 2021)	2021

26	Dr. Manjunath S C	Performance Comparison of IPFC- Based Controllers for toDampen Oscillations in the Power system	International Journal of Emerging Trends in Engineering Research	Performance Comparison of IPFC- Based Controllers for toDampen Oscillations in the Power system	2021
27	Dr. Kumara swamy B G	Advances in Physical Sciences and Materials (ICAPSM 2021)	A Analytical Study of Wind Speed Distribution at Government First Grade College Premises in Hosadurga, India	Advances in Physical Sciencesand Materials (ICAPSM 2021)	2021
28	Dr. Satish J	Advances in Materials Research (ICAMR - 2019)	Study of Wear Behaviour of Magnesium Hybrid Metal Matrix Composites Using Taguchi Method	Proceedings of International Conference on Advances in Materials Research (ICAMR - 2019)	2020
29	Dr. Gururaj T &Prof.Pavithra A.P	Open source software tools for bioinformatics	Statistical Modelling and Machine Learning Principles for Bio informatis,Techniqes, Tools, and Applications, Algorithms for intelligent Systems(AIS)	Advances Engineering And Technology	2020
2019-20					
30	Rajesh AM	ADVANCED COMPOSITES and Materials	Material characterization of SiC and Al2O3–reinforced hybrid aluminum metal matrix composites on wear behavior	ADVANCED COMPOSITES	2019
31	Rajesh AM	Engineering Tribology in Industry	Effect of Heat Treatment on Wear behavior of Hybrid Aluminum Metal Matrix Composites	Tribology in Industry	2019

32	Rajesh AM	Advanced Manufaturing Composites and Materials	Generation of mechanically mixed layer during wear in hybrid aluminum MMC under as-cast and age hardened conditions	SN Applied Sciences	2019
33	Rajesh AM	ACTA TECHNICA CORVINIENSIS	EFFECT OF ADDITION OF SIC AND AL2O3 ON WEAR BEHAVIOR OF HYBRID ALUMINUM METAL MATRIX COMPOSITES	ACTA TECHNICA CORVINIENSIS	2019
34	Sathish J	Advances in Engineering Science and Computing	Experimental investigation on wear process parameters of magnesium metal matrix composites using Taguchi method	JETIR	2019
35	Sathish J	International Journal of Engineering Science and Computing	Wear Performance of Mg-5%SIC-5%Al2O3 Metal Matrix Composites Using Taguchi Method	IJMRA	2019
36	Sathish J	Research in Advence Technology,	Effect of Sintering Temperature, Load and Sliding speed on the Wear behavior of Mg–SiC-Al2O3 metal matrix Composites using Taguchi method	International Journal of Research in Advent Technology,	2019
37	Jagannatha N	Recent trtends in Applied Mechanics and Materials	Hybrid Non Conventional Machining of Glass - A Review	Applied Mechanics and Materials	2019

38	Jagannatha N	Recent trends in mechanical handling and automation	Optimization of machine parameters on surface roughness	International journal of mechanical handling and automation	2019
39	Dr. H R Manohara	Recent trtends in Applied Mechanics and Materials	Influence of titanium carbide and activated carbon particles on the wear of mechanical properties	CSIR	2019
40	Rajesh AM	Advances in ACTA TECHNICA CORVINIENSIS	EFFECT OF ADDITION OF SIC AND AL2O3 ON WEAR BEHAVIOR OF HYBRID ALUMINUM METAL MATRIX COMPOSITES	ACTA TECHNICA CORVINIENSIS	2019
41	B G Devika	Advnces in Science Molecular Structure and Synthesis	Corrosion behaviour of metal complexes of antipyrine based azo dye ligand for soft-cast steel in 1 M hydrochloric acid	Journal of King Saud University- Science	2019
42	B G Devika	Advnces in Molecular Structure	Synthesis, characterisation and molecular structure study of metal complexes of antipyrine based ligand	Journal of Molecular Structure	2019
2018-19					
43	H R Manohar	Engineering Research and Application	Dry Sliding Wear Behavior and Evaluation of Mechanical Properties of AA6061-B4C Composites	Journal of Engineering Research and Application	2019
44	H R Manohar	Innovations in manufacturing material	Processing and evaluation of mechanical properties and dry sliding wear brhavior of AA6061-B4C Composites	Journal of manufacturing material	2019

45	K B Siddesh	Adances in Engineerring eciences and Technology	Mathematical modeling of sliding mode reaching laws for buck converter	IJITEE	2019
47	K B Siddesh	Adances in Innovation eciences and Technology	Robust reaching law for chattering mitigation in sliding mode controlled DC-DC buck converter	Journal of Advanced Research in Dynamical & Control Systems	2019

PRINCIPAL
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2nd International Conference on Advanced Trends in Mechanical & Automation Science

(ATMA-2023)

Thermal conductivity and resistivity of 3-D printed carbon fiber reinforced polyamide composites

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Abstract

Due to their outstanding specific mechanical properties, substantially better thermal conductivity, and lower thermal expansion, high strength carbon fiber-reinforced polymer matrix composites have attracted a lot of interest recently. Moreover, applications for satellite technologies, electronic gadgets, and heat dissipation have increased the popularity of 3-D printed fiber reinforced thermoplastic composites. This study investigated the thermal conductivity, and thermal resistivity of composites reinforced with short carbon fibers (SFs) in polyamide 6,6 (PA). The KD2 Pro-thermal analyser was used to carry out the experimental measurements. The thermal conductivity of the PA/SF composite is 71% greater than that of pristine PA at 0.142 W m^{-1} K^{-1}. The SFs uniformly disseminated inside the PA matrix and clearly established to construct the heat conduction path are primarily responsible for the improvement of thermal conductivity and the interaction between SFs and PA lowered the contact thermal resistivity. For next-generation electrical gadgets, the composites can serve as a heat sink.

Keywords: *PA/SF composite; 3-D printing; Thermal conductivity; Thermal resistivity*

1. Introduction

Additive manufacturing has gained immense popularity because of its advantages over the conventional machining. Today 3-D printing techniques such as fused deposition modelling (FDM) have taken over accurate fabrication of complex and intricate modelling. On a similar note, polymer technology has seen some tremendous advancements. 3-D printed polymers and their composites are widely preferred for their feasible production, load carrying capacity, economic and ergonomic advantages over traditional materials. [1-4]. In the quest to optimize the functionality of polymers, property enhances such as fibers and fillers are being reinforced and blended. One such attractive material is the carbon fiber reinforced polymer composites [5,6]. It is known to display superior qualities over neat polymers. Ever since its development, extensive research on the mechanical properties of polymer matrix composites have been made to facilitate the ever-growing demand. On the other hand, relatively very little research has been made on thermal properties of polymer composites.

The computer era has witnessed a widescale progress of polymer matrix composites in development of electronics, integrated circuits, boards, sensors and supercapacitors, heat sinks and dissipation devices, aerospace, and satellite technologies and so on [3,4,7-9]. To meet such production requirements, it is important to note that a detailed understanding of the thermal properties such as thermal conductivity, resistivity, melting, and crystallization temperatures be attained in addition to the basic mechanical properties.

A thorough literature survey [6, 10-20] tabulated in Table 1. has indicated that whilst an array of routine fabrication techniques like solvent mixing, reduced pressure compression, injection molding and many more has been adopted for thermal analysis of carbon inclusive composites, studies on the 3-D printed short carbon fiber reinforced

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2nd International Conference on Engineering Innovation
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For His/Her Paper Titled

Design and Analysis of Topologically Compressed Flip Flop with Maximum Power Saving

in the 2nd International Conference on Engineering Innovation (ICEI-2023), organized by the Jain Institute of Technology, Davanagere, India in association with Technical Institute for Engineers on 2nd June, 2023.

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GRENZE

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Analysis of Value Stream Mapping Framework with Machine Learning Techniques

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Abstract—**A significant shift from mass production to lean manufacturing has been taking place in the industrial systems. The primary objective of mass manufacturing is high-volume production, with just a few product options available. The goal of lean manufacturing is to reduce waste wherever possible, which in turn simplifies and streamlines production processes and helps bring down costs. Eliminating seven different types of waste is the primary goal of lean manufacturing. These wastes include overproduction, processing, waiting, transportation, faults, inventory, and storage. Recent years have seen an increase in the number of waste categories, with the eighth now being underutilised worker creativity and the ninth being environmental waste. Value Stream Mapping, often known as VSM, is one of the most important techniques used in lean manufacturing. Maintenance that is Total and Productive TPM 5S Work cells, line balancing, and so on and so on The value stream map (VSM) is one of the essential tools used in lean manufacturing, and it must be developed first in order to enable lean methods. Construction of the existing state map, identification of improvement recommendations, and implementation of those proposals in the future state map are all part of VSM. Prioritization of the improvement recommendations is necessary, as is the development of an appropriate mapping to illustrate the connections between the wastes and the improvement plans. This paper study offers the integration of Quality Function Deployment, or QFD, to prioritise the improvement recommendations in this setting. This paper makes use of fuzzy quality function decomposition (QFD) in order to deal with the fuzziness and imprecision that are inherent in the data. In this thesis, there are reports on four different case studies. The first research was conducted at an establishment that specialises in the production of pumps. The present map of the state was built via the collection of necessary data.**

Index Terms— **Ultra sound Imaging, ant colony optimization (ACO) and bird swarm algorithm (BSA), Segmentation, impulse noise.**

I Introduction

In today's world, manufacturing companies are in a position to rethink and rebuild their production processes in order to redefine and redesign their manufacturing systems to satisfy the competitive demands that have been

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A Performance Assessment of a Slotted Reconfigured Microstrip Patch Antenna for Multi-Wireless Applications

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Abstract - A Dual Frequency reconfigurable antenna is presented in this paper. Achieving Reconfigurability in the resonant frequency of microstrip patch antenna by introducing slots and structure alteration has been proposed. The proposed designs of rectangular microstrip patch antennas are resonating at 5 and 2.1 GHz(reconfigured) respectively. Modeling of reconfigurable antenna to achieve max size reduction by introducing partial ground concept and patch structure alteration has been used. Modelling of reconfigurable antenna for multiband operation is the one of the major challenges and the solution for this challenge is by introducing the slots over the patch of the antenna. To achieve wider bandwidth for wireless applications changing the structure patch and partial ground plane concept is proposed. Reconfigured antennas are well known for their characteristics like lightweight, low profile, and compact enough to be employed in smart wearable technology as well as portable electronics (such as, watches, smartphones, iPads, PDAs, and laptops), A Finite Element Method (FEM) and numerical Finite Integration Technique (FIT) are used in CST Microwave studio to estimate the antenna scattering and far-field characteristics.

Keywords - Frequency reconfigurable antenna, FIT, FEM

I. INTRODUCTION

A modern communication device (such as a smart phone, IPAD, PDA, or laptop) is required to handle multiple services, hence an antenna that can broadcast and receive at several frequency bands is need of the hour. Global System for Mobile Communication (GSM at 1.712.17GHz), Universal Mobile Telecommunications System (UMTS 1.92-2.17GHz), Personal Communication System (PCS at 1.85-1.99 GHz), Bluetooth (at 2.4-2.48GHz), Wireless Fidelity (Wi-Fi at 2.4 GHz), and certain other specific wireless applications require a specific frequency standard for operation [1-4]. Researches focus on constructing effective frequency reconfigurable planar antennas (FRPA's) because of these attractive characteristics (size, cost, and numerous frequency bands). [2-4]. The major work in the field of microstrip antenna design is to have multi band operation with reduced size and maintaining considerable gain, VSWR and return loss in the operating frequency range for various wireless applications. Planar antennas are the best choice because of their low profile, lower incidence in size, light weight, and ease of system integration, which make them more suitable for accommodating various wireless technologies in a single antenna hardware [5-8]. The majority of dual band antennas are linearly polarized for the dual band operation. Such a category of multiband antennas is classified as frequency reconfigurable antennas (FRA's).

The capacity to operate just in the desired range of frequency while rejecting adjacent ones is provided by a frequency reconfigurable antenna. This minimizes interference, increasing signal to noise ratio (SNR) and channel capacity as a result [9]. As the communication spectrum shifts, a multiband antenna, which concurrently covers many bands, is needed to separate the RF signals. By adjusting the length of the resonating parts [10] and slots [8] in this article, frequency reconfigurability can be achieved. The presented Microstrip antenna runs at 2.3 GHz and is appropriate for WiMax at IEEE 802.16 standard, wireless body area networks, and telemedicine applications.

Fig 1 summarizes the most popular and extensively employed methods to accomplish reconfigurability.

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Review IJGC

Strengthening Forest Conservation with an IoT-Based Anti-Poaching Alarm System for Trees

Ramesh. B. E[1], Basantha kumari[2], Sanjay. R[3,*], Aishwarya. H[4], Hari Menon[5], Vibha Soni. S[6]

Abstract

There are frequent incidents of theft of valuable trees, such as sandalwood, sagwan, and timber, worldwide. These trees are used in medicine, cosmetics, furniture, and more. To prevent such theft and protect the forests, preventive measures must be taken. Additionally, forest fires can cause significant damage to wildlife and trees, so it is crucial to control them quickly. To address these issues, a framework has been developed that utilizes three sensors (tilt, vibration, and flame sensors) to detect tree cutting, illegal logging, and forest fires. The GPS module sends the precise location of the theft to forest authorities, and the information is transmitted through an IoT model.

Keywords:

INTRODUCTION

This paper presents an all-encompassing framework aimed at combating tree poaching and preventing deforestation, with the ultimate goal of promoting environmental stability and addressing global warming concerns. Tree poaching is a widespread issue not limited to India; it is prevalent in countries such as China, Australia, and several African nations. The illegal cutting and smuggling of valuable tree species like Indian sandalwood and Red Sanders, which are significant in medicinal and cosmetic industries, pose serious threats to the environment [1].

To address these challenges, the Indian government seeks to restrict sandalwood exportation. The proposed IoT-based system consists of a transmitter module equipped with sensors and controllers, and a receiver module that utilizes an Android phone interface. This system aims to combat tree smuggling, protect forests from fire accidents, and foster sustainable environmental conservation by continuously transmitting data to the cloud.

A portable wireless sensor node, integrated into a wireless sensor network, will be mounted on each tree trunk to detect theft and fire incidents. The main objective is to deploy a system that effectively curbs incidents like sandalwood tree smuggling.

The paper suggests a microcontroller-driven strategy for countering poaching activities, utilizing Wireless Sensor Network (WSN) technology. This approach aims to identify instances of theft by observing vibrations generated during the process of tree cutting. The vibration data is collected through various experiments on wood and then simulated. The framework incorporates three types of sensors: tilt sensor (to detect tree inclination during falling), flame sensor (to identify forest fires), and vibration sensor (to detect tree cutting by smugglers). Additionally, a webcam is employed for real-time monitoring of forest conditions [2].

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Tribological Study on Effect of Chill Casting on Aluminium A356 Reinforced with Hematite Paticulated Composites

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Abstract

In this paper, an effort has been made to study the influence of copper chill on tribological properties of Aluminium Metal Matrix Composites (AMMCs). Hematite particles are used as reinforcement in the metal matrix of A356. The composite was developed through sand casting process with and without copper chills to get homogeneous and isotropic material properties. Hematite particles were reinforced at different weight percentage ranges from 0 wt% to 12 wt% in phases about 3 wt%. Experiments were conducted to study the wear behaviour using pin on disc type dry sliding wear testing equipment, the parameters like applied loads, sliding velocities, and the co-efficient of friction were varied by keeping sliding distance and time as constant. The composites of casted with copper chills revealed superior wear resistance as compared to the composites of casted without copper chills. Micrographic analysis was performed using XRD (X-Ray Diffraction) patterns and (Scanning Electron Microscope) SEM photos. The existence of Hematite particles was confirmed from XRD and also found that the uniform dispersal of Hematite particles in the A356 matrix alloy of composites casted with copper chills. The fine grained structure was obtained due to rapid cooling which influence in improving wear resistance in the composites with copper chills. It was also observed from SEM photos the worn-out surface is smooth in the composites of 9 wt % casted with copper chills as compare to that off without copper chills.

Keywords A356 · Hematite · AMMCs · Chill casting · Dry sliding wear · Microstructure

1 Introduction

Nowadays in industries, aluminium alloy plays a dynamic role to get better consequences. The aluminum metal matrix composites are extreme use in the zones like automotive, military and aircraft, etc., because of their high toughness, strength, hardness with better wear and corrosion resistance [1–3]. The reinforcement of Hematite particles (hard ceramic particles of iron ore) into the aluminium shows improved Properties towards the application in the areas of wear and tear [4]. The sand casting with superior properties must found by using metallic elements as end chills like copper, which effects on the microstructure, tribological and mechanical properties [4, 5]. Chill casting through sand mould using liquid metallurgical method being one of the most profitable and extensively used for castability of MMCs [6]. Shankar Subramanian et al. [7] reported on exhaustive review on the abrasive wear performance of aluminum alloy blend with several reinforcements. The experimental investigation of wear behaviour on composites reinforced with sugarcane bagasse ash and particles of silicon carbide was carried out and the results shows that the reinforced composite exhibit superior wear resistance than as-cast composites. S. Balakumar et al. [8] studied the wear performance of the casted Al6061 alloy with several reinforcements like fly ash, copper and graphite powder, the results shows wear resistance was improved on composite sampling contrasted along as-cast specimens. Viney Kumar et al. [9] examine the MMC's in which wear characteristics of Al 6061 alloy blend with different reinforcement of fly ash, magnesium, graphite at different weight percentage, result shows increased wear properties of composite specimens as compared to as-cast specimens. S. Mishra et al. [10] examine the wear

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Original Article

GA-Based POD and GADC-Based Voltage Regulator for IPFC to Dampen Low-Frequency Oscillations

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Abstract *- The new GAPOD-and GADC-based voltage controllers for the suppression of LF oscillations for the IPFC in the integrated-connected power systems are proposed in this research work to dampen the fluctuations and improve the quality of power (power quality - PQ). The developed controller was compared with the PSOMSF-based DC type of voltage controller, the GAMSF-based DC type of voltage controller and the conventional type of IPFC controllers in an MMPS under various operating parameters. The findings obtained in this work indicate that the GAPOD-GADC-based voltage regulators are quite successful in operation. They provide good output in the face of changing operational conditions and severe load disruptions.*

Keywords *- IPFC, PSOMSF-based DC type of voltage controller, GAMSF-based DC type of voltage controller, MMPS(multi-machine power system).*

1. Introduction

The authors in [1] worked on modelling a SMIB network, which was incorporated using an IPFC and an SVC. A power system stabilising (PSS) unit without the FACT-based controlling component could be developed, created, and implemented. A synchronised control configuration of IPFC and SVC without the PSS could be carried out after choosing the most appropriate IPFC control signal utilising the residual-based theory. In the absence of PSS, the IPFC- and SVC-based dynamic controllers could be used to dampen out the LF fluctuations or the distortions. They then demonstrated that the PSS controller outperformed other controllers in terms of enhancing the dynamic stability of the power grid. Furthermore, in the absence of the PSS system, the IPFC and SVC controllers behaved admirably with good performance criteria and achievements. The PSS controller outperformed other controllers to enhance the dynamic stability, and the results of IPFC and SVC controllers proved adequate in the absence of PSS.

In the research paper discussed in [2], the authors investigated IPFC effects on an advanced FACTS controlling system for dampening the LF PS oscillations using additional controlling circuitry. A revised and linearised PH model for an IPFC-installed SMIB system was set up to implement this dampening process. The POD controlling device was remodelled and tested to produce satisfactory results. It investigated the effects of the dampening controlling device on the power system network, subjected to large fluctuations in load situations (light and heavy loads) and the parameters of the system's network with T-lines. Results of dynamic simulations have demonstrated that under large changes in the loading condition and device variables, the dampening controllers that modulate the controlled waveform parameter m_2 give more dynamic efficiency during the operating conditions.

The authors in [3] developed a nonlinear model of FACTS-type IPFC equipped with SMIB in addition to the Heffron Philips model. The optimal variables in the IPFC controlling circuitry were determined using the PSO algorithm based on two fitness functions. Moreover, the candidate signal for the dampening of LF oscillations of IPFC input signals was selected based on controllability indices that consider the best signal is having a high index (Δm_2) and the worst signal to have the lowest one ($\Delta\delta_1$). The SMIB incorporated with the IPFC damping controller was investigated in a wide range of operating zones through eigenvalue analysis and simulations in the nonlinear mode to prove the robust property and effectiveness of damping controller settings.

The researchers in [4]performed extensive work on establishing the linearised P–H model of an IPFC-mounted power system. The P–H damping controllers were configured to dampen the LF oscillations in a power system network, considering four alternate damping controllers based on the IPFC. Simulation findings of Matlab/Simulink showed that the signals ml and m_2 had a greater effect on the damping oscillations, and the δ_1 signal andδ_2-dependent controllers had a lower effect on oscillation damping.

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Detection of Skin Cancer using Artificial Intelligence & Machine Learning Concepts

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***Abstract*—In this paper, the detection of Skin Cancer using Artificial Intelligence & Machine Learning Concepts is presented. Convolutional Neural Networks (CNN) in the area of image recognition are one of the many complex challenges that Deep Learning has gained attention for in recent years. Transfer Learning (TL) approaches are also becoming more and more common as a way to retrain some of the layers of Neural Networks that learnt from a generic dataset, putting it to use in another situation. This is because Neural Networks can occasionally attain more than 50 layers deep. In this work, we try to use CNNs and TL methods on pre-trained Neural Networks to separate seborrheic keratosis and nevus benign tumours from melanoma skin cancer. Skin cancer can be detected early thanks to AI. Deep convolutional neural networks, for instance, can be used to construct a system that assesses skin image data to detect skin cancer. For skin cancer to be effectively treated and to have better outcomes, early detection is crucial. The use of artificial intelligence (AI) technologies, such as shallow and deep machine learning-based techniques that are trained to detect and categorise skin cancer using computer algorithms and deep neural networks, is therefore being made to assist in the diagnosis of skin cancer. The purpose of this study was to categorise and list the many AI-based technologies that are used to find and classify skin cancer. By examining the relationship between the size of the data set, the number of diagnostic classes, and the performance measures employed to assess the models, the study also looked at the validity of the papers that were chosen. The results shows the effectiveness of the method put in this paper**

***Keywords*—Skin, Cancer, Detection, Software, AI, ML, CNN.**

I. INTRODUCTION (*HEADING 1*)

The concept for identifying skin cancer using AI and ML techniques is designed and developed in the study. Convolutional Neural Networks (CNN) in the area of image recognition are one of the many complex challenges that Deep Learning has gained attention for in recent years. Transfer Learning (TL) approaches are also becoming more and more common as a way to retrain some of the layers of Neural Networks that learnt from a generic dataset, putting it to use in another situation. This is because Neural Networks can occasionally attain more than 50 layers deep.

The human body's first line of defence against outside objects is its skin. It creates the pigment melanin, which protects our bodies from UV light. One of the biomarkers used in the early identification and monitoring of melanoma skin cancer is this pigment as well as the underlying blood vessels. One of the worst forms of skin cancer, melanoma typically develops as a result of excessive exposure to the sun's UV radiation, which damages DNA.

The skin serves as the body's initial line of defence against foreign things. It produces the melanin pigment, which shields our bodies from UV rays. This pigment and the underlying blood vessels are two indicators utilised in the early detection and monitoring of melanoma skin cancer. Melanoma, one of the most dangerous types of skin cancer, often arises as a result of prolonged exposure to the sun's UV radiation, which harms DNA [1][2]. Skin cancer can be detected early thanks to AI. Deep convolutional neural networks, for instance, can be used to construct a system that assesses skin image data to detect skin cancer. For skin cancer to be effectively treated and to have better outcomes, early detection is crucial.

The Skin Cancer Foundation estimates that 9,320 Americans lose their lives to melanoma each year, and that there were initially expected to be 178,560 new cases of the illness in 2018 alone [1]. If melanoma is correctly recognised, it can be treated in its early stages; otherwise, it can spread and be fatal. The accuracy of the procedures now used by the majority of dermatologists ranges between 75 and 85 percent [2] since the majority of body marks, such as moles, brown patches, and growths, are often benign and difficult to distinguish from melanoma. Asymmetry, Border irregularity, Color, Diameter, and Evolving, or ABCDE signs of melanoma, are frequently utilised to distinguish between benign and malignant pigments [3][4].

The ABCDE rule has been very helpful to dermatologists over the years, but the detection process frequently calls for a highly skilled professional and can take some time. The rule also makes it difficult to recognise minor, early-stage

An Experimental Investigation on Lego Blocks Using Industrial and Agricultural Waste

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Abstract. This research involves a brand-new interlocking construction prototype that was inspired by Lego. The most popular toys for youngsters to assemble various structures, including buildings and bridges, are Lego Blocks. The blocks are always used to construct constructions through dry joints that can be disassembled without causing damage to the blocks. The building bricks can be used again to put together the construction in a completely different configuration.

This idea is based on the concept of interlocking blocks which are prepared using industrial and agricultural wastes such as pond ash, fly ash and bagasse ash as the replacement materials for cement and fine aggregates with various experimental proportions and mix design. Further the quality check process is carried out on the blocks to know the strength, water absorption and fire resistivity according to the IS standards. We hereby have tried to develop eco-friendly and economical blocks with good strength.

Keywords: Lego Blocks, Fly ash (F.A.), Pond ash (P.A.), Bagasse ash (B.A.), Eco friendly blocks.

1 Introduction

In building and construction, bricks are essential. It is widely known that the production of burnt clay brick has always been an energy and resource intensive operation, despite its dependable workability and accessibility.

Automatic Brick Laying was the term given to Lego brick construction in Denmark in 1949. In 1951, the phrase "Automatic Brick Laying" was changed and given its ultimate name: "Lego brick", which was first commercially commercialized in 1958. Since the 1970s, pressed cements and brick has expanded throughout Africa, Canada, the Middle East, and India, starting in Africa[1].

The innovation and experimentation is always required in order to make life easy and economical. In the modern days, the production of red clay bricks are proving very uneconomical and also resource intensive as they are produced using the mud, dug from the earth, to burning bricks. Later in 1890 the first hollow concrete blocks was made by Harmon S. parker in the United States. The use of concrete blocks became a trend as they are fast in production, easily obtained and cheaper in hand. The more the use of concrete blocks, more the use of cement which also has its disadvantages, like carbon dioxide, greenhouse gases, particulate matters are emitted to the atmosphere.

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SENSOR BASED SOIL NUTRIENT MONITORING IN AGRICULTURE

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Abstract

The creation and use of sensing technology is one of the main components in achieving sustainability in agricultural production through precision agriculture. This article outlines the primary sensing methodologies used for tracking soil nutrients in view of recent improvements in the sensing devices utilised in literature. To locate the nutrients in the soil, the designed prototype has AS73211 colour sensors that work with a NODE MCU. Two different soil samples were used for the measurement. Testing on various samples showed that Nitrogen and Potassium is more that the threshold values of 445-485nm and 625 – 685nm respectively in both the soil samples. The method developed is more useful and suitable for use in farming.

Keywords: NPK, Soil Sensor, NODE MCU

1. INTRODUCTION

Many sorts of technology have now been developed in the field of advanced technology to make it easier for people to go about their everyday lives. Many instruments have been developed in agricultural technology and elsewhere to aid farmers in carrying out their agricultural operations and producing healthy crops. Land with sufficient fertiliser is one of the essential elements that should be present for a decent yield. In order to meet the demands of a society that is increasingly dependent on food supply, enough fertiliser may help plants generate good yields and volumes. Every nation must have enough nutrients (NPK) quantity of crops. These three nutrients each support different aspects of plant growth: nitrogen supports the development of leaves, phosphorus supports the evolve of roots, and potassium supports the development of flowers and fruits while maintaining nutrient and water balance in plant cells. A variety of techniques, including optical, electrochemical, acoustic, electrical and electromagnetic, and mechanical ones, have been used by previous researchers to construct NPK detection devices [2]. [3] Provides a useful overview of sensors for precision agriculture. Because of its exceptional sensitivity and quick reaction, the optical detection approach has recently been found to offer a better potential for real-time detection [4]. Many studies on the detection of NPK soil using optical methods [1, 5-7] have been published. In these experiments, the soil is lit by a light. To drive the light to the earth, the majority of the produced systems included additional optical components such fibre optics [7, 8].

An optical detection approach based on colour detection is used in this work. The detection method is regarded as a direct detection method since it does not require any extra components. Using a photodiode that can convert light into electricity. The AS73211 chip is employed for both colour conversion and this function. The output current is transformed and presented as a result of NODE MCU's manipulation of the chip's output.

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Experimental Investigation and Processing of Aluminum with Silicon Carbide and Graphite Particulates

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***Abstract* - Metal matrix composites (MMCs) are materials made composed of a metallic matrix and a ceramic phase in the form of particles and platelets, whiskers, short fibres, and continuous linked fibres.**
In most cases, it is weight savings. The purpose of this research is to investigate the fracture toughness and hardness of Aluminum matrix composites containing Silicon Carbide (4%) and Graphite (8%) at a single weight fraction. Processing of hybrid composite is done by the stir casting technique. Specimens are cut according to the ASTM standard E399 [18] by using EDM wire cut machine.
From the fracture toughness, we understand that increase in the thickness of the material the behavior of the material changes. From the hardness test we understand that compared to base material hardness, adding reinforcement the hardness of the material increases.

Keywords: Metal matrix composites, Fracture Toughness, Hardness.

I. INTRODUCTION

Metal matrix composites (MMC's) are a broad range of materials made up of metallic matrix particles, short fibres, platelets, continuous aligned fibres. MMC are usually used in applications such as structure application. Which increased resistance properties, superior thermal characteristics and in most situations weight reduction.
MMc's are reinforced by both continuously and discontinuously [1] are employed. The addition of the reinforcement boosts the matrix's stiffness and strength. The matrix is the monolithic material into which the reinforcement is embedded, and is completely continuous [6]. However, the improvements in stiffness and strength generally come at the expense of ductility and fracture resistance. The addition of hard particle reinforcement to composites prevents them from becoming too soft [8].
Continuously reinforced composites are substantially more expensive to manufacture than discontinuously reinforced MMCs. As a result, when compared to aligned reinforcements, discontinuous reinforcements provide better matrix performance at lower additional costs. Manufacturing Particulate Reinforced MMCs is less expensive than reinforced composites. As a result, particle reinforcements cost less than fibre aligned reinforcements when it comes to improving matrix performance. Furthermore, particle reinforced composites have isotropic properties, but composites with fibre aligned reinforcements have significantly anisotropic properties [1].As a result, particle reinforced composites can outperform fibre reinforced composites in applications demanding isotropic characteristics. Because of faults such as inclusions, flaws, and cracks, all structural materials do not have theoretically determined strength.

II. MATERIAL & PROCESSING

Aluminium (6061):
The precipitation hardening aluminum alloy is referred to as Al6061, containing main alloying elements such as silicon and magnesium. It is a standout amongst the most well-known alloys of aluminum for common purpose use. It generally exists in pre-tempered grades (solutionized 6061-0) and tempered grades (6061-T6 and 6061-T651).
Al6061 is generally used for the construction of wings and fuselages in aircraft structures, generally in homebuilt aircraft than commercial or military aircraft.

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Cyber Attack Detection and notifying system using ML Techniques

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Abstract:
Cyber-crime is proliferating everywhere exploiting every kind of vulnerability to the computing environment. Ethical Hackers pay more attention towards assessing vulnerabilities and recommending mitigation methodologies. The development of effective techniques has been an urgent demand in the field of the cyber security community. Most techniques used in today's IDS are not able to deal with the dynamic and complex nature of cyber-attacks on computer networks. Machine learning for cyber security has become an issue of great importance recently due to the effectiveness of machine learning in cyber security issues. Machine learning techniques have been applied for major challenges in cyber security issues like intrusion detection, malware classification and detection, spam detection and phishing detection. Although machine learning cannot automate a complete cyber security system, it helps to identify cyber security threats more efficiently than other software-oriented methodologies, and thus reduces the burden on security analysts. Hence, efficient adaptive methods like various techniques of machine learning can result in higher detection rates, lower false alarm rates and reasonable computation and communication costs. Our main goal is that the task of finding attacks is fundamentally different from these other applications, making it significantly harder for the intrusion detection community to employ machine learning effectively.

Keywords: Cyber-crime, Machine learning, Cyber-security, Intrusion detection system.

1. INTRODUCTION

Today, political and commercial entities are increasingly engaging in sophisticated cyber-warfare to damage, disrupt, or censor information content in computer networks. In designing network protocols, there is a need to ensure reliability against intrusions of powerful attackers that can even control a fraction of parties in the network. The controlled parties can launch both passive (e.g., eavesdropping, nonparticipation) and active attacks (e.g., jamming, message dropping, corruption, and forging). Intrusion detection is the process of dynamically monitoring events occurring in a computer system or network, analysing them for signs of possible incidents and often interdicting the unauthorized access. This is typically accomplished by automatically collecting information from a variety of systems and network sources, and then analysing the information for possible security problems. Traditional intrusion detection and prevention techniques, like firewalls, access control mechanisms, and encryptions, have several limitations in fully protecting networks and systems from increasingly sophisticated attacks like denial of service. Moreover, most systems built based on such techniques suffer from high false positive and false negative detection rates and the lack of continuously adapting to changing malicious behaviours. In the past decade, however, several Machine Learning (ML) techniques have been applied to the problem of intrusion detection with the hope of improving detection rates and adaptability. These techniques are often used to keep the attack knowledge bases up-to-date and comprehensive. In recent days, cyber-security and protection against numerous cyber-attacks are becoming a burning question. The main reason behind that is the tremendous growth of computer networks and the vast number of relevant applications used by individuals or groups for either personal or commercial use, especially after the acceptance of the Internet of Things (IoT). The cyber-attacks cause severe damage and severe financial losses in large-scale networks. The existing solutions like hardware and software firewalls, user's authentication, and data encryption methods are not sufficient to meet the challenge of upcoming demand, and unfortunately, not able to protect the computer network's several cyber-threats. These conventional security structures are not sufficient as safeguard due to the faster rigorous evolution of intrusion systems. Firewall only controls every access from network to network, which means prevent access between networks. But it does not provide any signal in case of an internal attack. So, it is obvious to develop accurate defense techniques such as machine learning-based intrusion detection system (IDS) for the system's security In general, an intrusion detection system (IDS) is a system or software that detects infectious activities and violations of policy in a network or system. An IDS identifies the inconsistencies and abnormal behavior on a network during the functioning of daily activities in a network or system used to detect risks or attacks related to network security, like denial-of-service (Dos). An intrusion detection system also helps to locate, decide, and control unauthorized system behaviour such as unauthorized access, or modification and destruction. There are different types of intrusion detection systems based on the user perspective. For instance, they are host-based and network-based IDS.

2. LITERATURE SURVEY

An IDS generally has to deal with problems such as large network traffic volumes, highly uneven data distribution, the

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AN AUTOMATED FACEMASK AND SOCIAL DISTANCE EVALUATION SYSTEM USING AWS

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ABSTRACT

According to statistics acquired by JHU CSEE, the SARS-CoV-2 epidemic has wreaked havoc on India, infecting more than 3 crore individuals. Face masks and safe social distance are two of the heightened safety procedures that must be observed in public areas to stop the SARS-CoV-2 from spreading. We propose an efficient tiny-YOLOv3 and SSD MobilenetV2 approach focused on real-time automated monitoring of people in public places to detect both safe social distancing and face masks by implementing the model on an effective cloud-based approach utilizing AWS services to create a safe environment that contributes to public safety. The facemask model will surround the person's face with a red colored bounding box after detecting the breach, and the social detection model operates on a similar principle by enclosing the defaulter inside the bounding boxes. We are availing the amazon web service's EC2 instance to host the web application. The web app is built on the Streamlit platform, which is a simple and flexible method to transform Python programmer to web apps. We use the tiny-YOLOv3 model, which is a scaled down version of the YOLOv3 model, to ensure that the application runs well on the website and on the cloud platform. As a result, the proposed technique helps society by lowering SARS-CoV-2 transmission.

Keywords :*AWS, SARS-CoV-2, Streamlit, tiny-YOLOv3, YOLOv3.*

I. INTRODUCTION

Since we are all aware that the Covid-19 epidemic has had a Significant impact on our lives, it is becoming increasingly difficult to carry out routine activities, and many facilities are closing to preserve social distance, among other things . Face masks and healthy social distance are two of the most important safety

A analytical study of wind speed distribution at Government first grade college premises in Hosadurga, India

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Abstract

Modelling of wind speed distribution (WSD) has become a necessary step in estimating the wind energy potential of a specific location. The statistical analysis of the potential for wind speed distribution at Government First Grade College [Lat. 13.79° N and Long. 76°28′ E] in Hosadurga city (Karnataka, India) is presented in this article. Over the course of a year, the wind speed at this location was recorded at the elevation of 60 m over ground. The annual WSD have been modelled using the scale parameter (c) and shape parameter (k) from the Weibull probability distribution (WPD). Weibull and normal approaches were used to compute the frequency distribution, which were found to be equivalent. Furthermore, the capacity factors (CFs) for commercially available wind energy conversion systems (WECS) have been evaluated to accomplish the efficient electrical power production in a given location.

Introduction

Harvesting of energy from wind has become one of the most demanding areas of research across the globe. Wind energy is a perennial, affordable and nonconventional source of energy [1]. Present day renewable technology has made that wind energy easily obtainable and economically viable. The ideal generation of wind energy from a WECS deployed at a specific location is highly dependent on a number of characteristics, including WSD variation, distinctive speeds of the turbine and hub extent. The optimal energy production can be attained by matching these elements to a turbine generator that is to be installed at a certain location. [2]. Simple WSD analysis based on the arithmetical average of the wind speed

Selection of an efficient wind turbine generator at Government science college premises Chitradurga, India

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Abstract. Wind speed modelling is very crucial in estimating the potential of wind energy for a particular site. In this paper, the wind energy potential at the premises of Government Science College area [Lat. 14°13′ N and Long. 76°27′ E] in Chitradurga town (Karnataka State, India) is statistically analyzed for the year 2019 – 2020. The speed of wind has been assessed at the height of 60 m from the ground level at the site. The seasonal and annual wind speed distributions (WSD) have been modelled using Weibull probability distribution functions (WPDF) i.e., shape parameter, *k* and scale parameters, *c*. With the use of them, the wind power density (WPD) has been determined. The WPD estimated from Weibull and normal methods has been found to be comparable. Further, at a height of 60 m above the ground, the capacity factors (CPs) of various marketablly useable wind turbine generators have been estimated to achieve the optimal power generation for the chosen site.

Keywords: Mean wind speed, Weibull distribution function, wind power density, capacity factor

1. Introduction

Across the globe, most of the countries have been encouraging the energy harvesting from wind energy resources as it is an affordable, inexhaustible and environmentally friendly alternative energy source [1]. The power output from wind energy sources has recently been observed to be on par with the power generated from conventional power generation methods. The enhancement in the power yield in wind energy can be attributed to the technological advancements that have taken place in recent times. Technology has now made the wind energy easily extractable and economically viable. The optimal installation of a wind energy system at a particular site crucially depends on several factors viz., variation of wind speed distribution, characteristic speeds of turbine and height of the hub. Therefore, it is very essential to employ the best available technologies to estimate these factors at a

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Performance Comparison of IPFC- Based Controllers for to Dampen Oscillations in the Power system

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ABSTRACT

This paper introduces a new approach the nonlinear dynamic model of an SMIB power system incorporated with an interline power flow controller (IPFC) to improve the damping oscillations of a power system. The performance of the IPFC was tested with a PSOMSF DC voltage regulator, compared with the genetic algorithm-based POD (GAPOD) and genetic algorithm-based DC (GADC) voltage regulator under various operating conditions. Time-domain simulation analysis revealed that the newly developed GA-POD and GA-DC voltage regulator has good capability for dampening low-frequency oscillations in power systems.

Key words : Interline power flow controller (IPFC), particle swarm optimization-based multistage fuzzy DC voltage regulator (PSOMSF DC voltage regulator), genetic algorithm-based POD and DC voltage regulator (GAPOD and GADC voltage controller).

1. INTRODUCTION

FACTS devices, such as SVC, STATCOM, UPFC, and IPFC, can be utilized for damping of low-frequency (LFO) oscillations in the power systems. SF Kodad, Anubhaprajapati and Kanchan Chaturrvedi etc all. used a UPFC supplementary controller to dampen low-frequency oscillations [1] – [15]. The IPFC is a completely new FACTS device that adds supplementary controllers, giving it the distinctive ability of damping low-frequency oscillations. In 2011, genetic algorithms were considered by S.F.Kodad, B.V. Sankar Ram, etc all to regulate DC link voltages [16]-[32].

Being universal search techniques, gene tic algorithms can help solve optimization problems by utilizing the method of natural selection and genetics. Jitendra Veeramalla and Sreerama Kumar R. proposed a GA-based lead-lag supplementary damping controller and used an SMIB power system to investigate the efficacy of the IPFC [7]. In 2008, the linearized Phillips–Heffron model of power system and damping oscillations studied at the nominal operating point was recommended by Alivelu M. Parimi [8]. In 2011, the PSO technique was employed by N. Rezaei, A. Safari, and H.A. Shayanfar to examine the damping control function of IPFC in an SMIB power system, and the performance index, based on the system dynamics, was utilized as a function to evaluate the potential of different IPFC control signals on the different operating situations of the power system [9]. In 2016, S.N. Dhurvey et al. put forward a simple method to dampen low-frequency oscillations using a fuzzy logic-based IPFC. To help achieve superior damping performance by choosing selecting efficient control signals, the IPFC performance was demonstrated with PI controllers compared with fuzzy logic-based controllers on a modified Phillips–Heffron power system model [10].

2. MOTIVATION AND RELATED WORK

Fuzzy logic controllers are employed for IPFC generally, for the improved functionality, performance, reliability, adaptability, and robustness they provide. Fuzzy sets are produced using speculative methods. To mitigate these shortcomings, a multistage fuzzy controller with a fuzzy switch for IPFC DC voltage controllers is considered in this paper to help improve the dynamic stability of power systems. Accurately constructing the membership functions is one of the most critical steps toward the design of any successful fuzzy control. But obtaining an appropriate set of membership function is a tedious and time-consuming process. It is because of these reasons that GA is employed – to reduce automatically the fuzzy system effort required to attain optimum tuning of membership functions in the MSF controller. Genetic algorithms engage a heuristic search and optimization technique inspired by natural evolution, favoring attractive features like robustness, simplicity, and so on. Yet, they cannot guarantee that the best solution will be established. Because it can sometimes converge to local, rather than global, optima, a modified GA based on the hill climbing method is proposed in this paper to improve the optimization method in order to assure global optima and to improve the speed of the algorithm's convergence to a large extent
The aim of this paper is to design a PSO-based MSF-DC voltage regulator and a GA-POD and GA-DC voltage regulator for IPFC FACTS devices. The efficacy of the proposed controllers is assessed under different operating conditions.

Study of Wear Behaviour of Magnesium Hybrid Metal Matrix Composites using Taguchi Method

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ABSTRACT

In this study, dry sliding wear behavior of Magnesium Hybrid Metal Matrix Composite was investigated and a forecast model was developed using Taguchi's technique. Magnesium metal reinforced with equal weight percentage of silicon carbide and alumina particles (pure mg, 5wt%, 10wt% and 15wt %) was produced using powder metallurgy technique. Wear tests were conducted using Pin-on-disc apparatus. The effect of applied load, sliding speed, temperature and weight percentage of reinforcement on the wear properties was investigated. It was found that as applied load and sliding speed increases, wear rate also increases. By increasing the temperature and weight percentage of reinforcements, the wear rate decreases and was found that at 75^0 temperature and 10% reinforced composite had more wear resistance. The forecast model indicates that the significant parameter that impacts the wear rate was weight percentage of reinforcement followed by applied load, temperature and sliding speed. By confirmation test, the anticipated wear rates were observed to be near to the experimental values.

Keywords: Wear Behaviour; Magnesium; Hybrid Metal Matrix Composite; Taguchi Method; Pin-on-disc

INTRODUCTION

In these days cast iron made vehicle parts has been replaced by metal matrix composites due to their excellent properties, high strength, stiffness, high wear resistance. The interest for developing metal matrix composites have been significantly increased being used in high performance functional applications including automobile and aerospace sectors [1]. The composites can be produced by including distinctive sorts and types of reinforcements. The particle-reinforced composites are more broadly utilized, which can be fabricated by utilizing liquid stir casting method or powder metallurgy technique [2].

Magnesium metal, a light weight material is utilized in the aerospace and automobile sectors for enhancing the vehicle performance by decreasing its weight. Magnesium is soft and delicate, however its structure made harder by addition of hard ceramic particles such as Silicon Carbide and Alumina particles [3]. Magnesium metal matrix composites reinforced with ceramic particles indicates huge improvement in tribological properties [4].

In this study, dry sliding wear behaviour of the Magnesium metal matrix composites was tested after the experiment was planned so that the data obtained could provide optimal wear conditions. Design of Experiments (DOE) based on Taguchi technique made a plan of experiments. An orthogonal array and Analysis of Variance were used to evaluate the effect of wear parameters such as applied load, temperature, weight percentage of reinforcement and sliding speed on dry sliding wear.

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Open-Source Software Tools for Bioinformatics

T. Gururaj and A. P. Pavithra

1 Introduction

Recently, Information and Communications Technology (ICT) were highly used in the domain of cloud deployments, social media, mobile applications, web servers and data transmission. IT has been involved in the various fields of the corporate and social world including medical sciences [1]. Most advanced equipments were available in the medical laboratories for accurately diagnosis and analysis of the human body and diseases. These diagnosis machines involve in the electroencephalography (EEG), computed tomography (CT), magnetic resonance imaging (MRI), etc. These devices are provided more information about the human body and assisted the medical experts for the diagnosis and selecting the suitable course of treatment.

With diagnostic machine, software tools and libraries are also used. Biological data collected by the computer diagnostics machines were analysed by the software tools. The concepts of bioinformatics have evolved that involve in the software tools and application for the analysing the medical and biological data for the diagnosis. These softwares use the powerful and high-end algorithms in the backend process for analysing the large collection of the medical data and that lead to better medical treatments. The molecular biology field is closely related to the bioinformatics, and the process was in similar to the biological structure analysis and diagnosis. Molecular biology involves in the process of deep analysis of the body cell movement with related to the proteins, biosynthesis, RNA and DNA.

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Material characterization of SiC and Al_2O_3–reinforced hybrid aluminum metal matrix composites on wear behavior

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Abstract

In the present investigation, wear test is conducted on a pin-on-disc device at room temperature for both the age hardening and without age hardening conditions. Al7075 has been chosen as the matrix material. Hybrid aluminum metal matrix composites are produced utilizing stir casting route for enhancing the wear behavior and hardness number. The reinforcement used is silicon carbide with 5, 10, and 15 wt% and alumina as the reinforcement in 5, 10, and 15 wt%. In the aluminum matrix, microstructural characterization reveals homogeneous mixing of reinforcements. This investigation shows that the enhanced wear resistance is due to the increment weight fraction of reinforcement. By raising the sliding speeds, there is a reduction in the rate of wear and it reduces with increment in the sliding distance. With increasing weight fraction, there is decrement in the rate of wear of composites. In general, tribological property enhances because of the addition of the two reinforcements.

Keywords

Al7075/SiC-Al_2O_3, dry sliding wear, wear rare, HAMMCs, SEM

Introduction

Metal matrix composites (MMCs) comprise an alloy or a metal as the matrix and a reinforcement such as particles, short fiber, or whisker and/or long fiber. MMCs are a group of materials with perspective for a broad collection of applications in structural management. Their properties such as light in weight, superior strength, and resistance to wear are the requirement for the aviation and automobile industries.

Discontinuously reinforced MMCs are much less expensive to fabricate than continuously reinforced composites. Consequently, performance enhancement of the matrix comes at lower additional costs with discontinuous reinforcements compared with aligned reinforcements. Particulate-reinforced MMCs are not expensive to manufacture than reinforced composites. Accordingly, performance improvement of the matrix comes at lesser expense with particulate reinforcements compared with fiber-aligned reinforcements. In addition, particulate-reinforced composites exhibit the isotropic properties,[1] whereas the properties of composites with fiber-aligned reinforcements are highly anisotropic.

Hybrid aluminum metal matrix composite (HAMMC) materials are an excellent substitute to conventional materials because of the enhanced hardness, specific strength, and creep resistance properties. Based on the literature survey made, one can consider the Al7075-silicon carbide

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RESEARCH

Effect of Heat Treatment on Wear behavior of Hybrid Aluminum Metal Matrix Composites

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Keywords:

MMC,
Al-SiC/Al_2O_3
Dry sliding wear
Age hardening
Taguchi's DOE
ANOVA

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A B S T R A C T

The focus of the paper is the wear behavior of hybrid aluminum metal matrix composites. The main objective of the investigation is to conduct the wear test at room temperature for both the as-cast and age hardening conditions. Materials chosen for the study are Aluminum 7075 as a matrix, Silicon Carbide and Alumina are the reinforcements. Hybrid metal matrix composites are produced by utilizing stir casting route for 5–15 wt.% silicon carbide and alumina. Microstructural characterization of hybrid aluminum metal matrix composites reveals the homogeneous mixing of reinforcements. It is noticed that the higher composite hardness is obtained due to the raise in weight percentage of the reinforcement up to 10% of hybrid reinforcements. In the T6 heat treatment, there is a gain in hardness by 24 % for optimum percentage of reinforcement i.e. 10 % compare with as-cast composites.

1. INTRODUCTION

Aluminum matrix composites (AMC)[1] is the largest gathering of MMCs. AMCs are normally based on aluminium-silicon compounds and on the combinations of series 2000 and 6000 series. AMCs are reinforced by Al_2O_3 (Alumina) or SiC (silicon carbide) particles in proportions of 03-20 wt% might be as long/short fibres and/or particles of Al_2O_3, SiC, Graphite. AMCs can be prepared by Powder metallurgy (sintering); Stir casting; Infiltration methods. High strength even at raised temperatures, high load/deformation, low density, high thermal conductivity, increased wear resistance behavior [2] are the some of the properties of AMCs. Hybrid aluminum metal matrix composites (HAMMC) materials are an excellent substitute to conventional materials, because of the enhanced hardness, specific strength and creep resistance properties. Based on these properties, one can consider the HAMMC for the automobile and aerospace applications [3].

A surface phenomenon referred as wear will occurs by relocation & separation of material. It generally suggests a progressive loss of material and change of measurements over some undefined time frame. The main components that influences wear and friction

Research Article

Generation of mechanically mixed layer during wear in hybrid aluminum MMC under as-cast and age hardened conditions

A. M. Rajesh[1] · K. Mohamed Kaleemulla[2] · Doddamani Saleemsab[3] · K. N. Bharath[4]

Abstract
In the present investigations, dry sliding wear test is conducted using a pin on disc tribometer at room temperature for both the as-cast and age hardening conditions. Al7075 has chosen as the matrix material. The reinforcement used are particles of silicon carbide and alumina with 5 wt%, 10 wt%, and 15 wt%. Hybrid aluminum metal matrix composites are produced utilizing stir casting route for enhancing the wear behavior. In the aluminum matrix, micro-structural characterization reveals the homogeneous mixing of reinforcements. From the investigation, it is observed that composites containing 10% by weight of silicon carbide and aluminum oxide reinforcements with ageing exhibited superior tribological properties. From the micro-structural study, it has been observed that the generation of the mechanically mixed layer in the hybrid aluminum metal matrix composites will lead to a reduction in wear rate.

Keywords Al7075/SiC–Al_2O_3 · HAMMC · Wear rate · MML · Dry sliding wear

1 Introduction

Composite materials are the combination of a matrix and a reinforcement material. To gain the advantages of mixing of the two different reinforcements in a single matrix, hybrid composites have been developed. In recent times hybrid composites have been established as highly efficient, high performance structural materials and their use is increasing rapidly. This is due to their improved properties which are gained from the combining of two reinforcements. Hybrid composites provide combination of properties such as tensile modulus, compressive strength and impact strength which cannot be recognized in composite materials.

Metal matrix composites (MMC) comprise of an alloy or a metal as the matrix and reinforcement such as the particles, short fiber or whisker and/or long fiber. Particulate reinforced metal matrix composites are not expensive to manufacture than reinforced composites and exhibit the isotropic properties [1], whereas the properties of composites with fibre aligned reinforcements are highly anisotropic. Typically, SiC, Al_2O_3, B_4C, and graphite [2] materials are used as reinforcements in particulate reinforced metal matrix composites.

A surface phenomenon referred to as wear will occur by relocation and separation of material. It generally suggests a progressive loss of material and change of measurements over some undefined time frame. The main components that influences wear and friction behavior of aluminum alloys are sliding distance and speed, normal load, frictional temperature, surface finish and contaminants, hardness, microstructure etc. Aluminum matrix composites (AMCs) are majorly impacted by the characters of the matrix and reinforcement material. The layer, mechanically mixed layer (MML) is produced during wear of aluminum alloys,

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EFFECT OF ADDITION OF SIC AND AL_2O_3 ON WEAR BEHAVIOR OF HYBRID ALUMINUM METAL MATRIX COMPOSITES

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Abstract: In the present investigations, wear test is conducted on pin on disc device at room temperature for both the age hardening and without age hardening conditions. Al7075 has chosen as the matrix material. HMMCs are produced utilizing stir casting route for enhancing the wear behavior and hardness number. The reinforcement used is silicon carbide with 5%, 10% and 15% weight percentage and Al_2O_3 as the reinforcement in 5%, 10% and 15% weight percentage. In the aluminum matrix Microstructural characterization reveals the homogeneous mixing of reinforcements. This investigation shows the enhanced in wear resistance is due to the increment weight fraction of reinforcement. By raising the sliding speeds there is a reduction in the rate of wear and it reduces with increment in sliding distance. As an increase in weight fraction there is decrement in rate of wear of composites. In general tribological property enhances because of the addition of the two reinforcements.
Keywords: Al7075/SiC–Al_2O_3, Dry sliding wear, wear rare, HAMMCs

INTRODUCTION

MMCs comprise of an alloy or a metal as the matrix and a reinforcement such as the particles, short fibre or whisker and/or long fibre. MMCs were a group of material with perspective for a broad collection of applications in structural management. Their properties such as light in weight, superior strength and resistance to wear are the requirement for the aviation and automobile industries.

Discontinuously reinforced MMCs are much less expensive to fabricate than continuously reinforced composites. Consequently, performance enhancement of the matrix comes at lower additional costs with discontinuous reinforcements compared with aligned reinforcements. Particulate reinforced MMCs are not expensive to manufacture than reinforced composites. Accordingly, performance improvement of the matrix comes at lesser expenses with particulate reinforcements compared with fiber aligned reinforcements. In addition, particulate reinforced composites exhibit the isotropic properties [1], whereas the properties of composites with fiber aligned reinforcements are highly anisotropic.

Hybrid aluminum metal matrix composite (HAMMC) materials are an excellent substitute to conventional materials, because of the enhanced hardness, specific strength and creep resistance properties. Based on the literature survey made, one can consider the Al7075–SiC/alumina particulate MMC for automobile applications such as: pistons, cam shafts, brake components, Bearing surfaces, cylinder liners, etc., and aerospace applications such as wing and fuselage (main body) of aircraft structure, internal aerospace engine components, exhaust systems.

A surface phenomenon referred as wear will occurs by relocation & separation of material. It generally suggests a progressive loss of material and change of measurements over some undefined time frame.

The principle tribological considerations that manage the wear and friction properties of discontinuously reinforced aluminium (DRA) composite can be categorized into two types (i) Mechanical and physical properties: such as loads, speeds, surface finish, sliding distance, orientation of reinforcement, temperature and environment etc. (ii) Material factors: for instance the type, size, and size distribution, shape, reinforcement's weight fraction, and the matrix microstructure [2].

The important parameter which influences the wear of materials is the microstructure. According to research reports, microstructure and mechanical properties have a correlation. On the other hand, to relate the wear techniques with microstructural characteristics only limited reports were used. The wear surface exhibits microstructural heterogeneity which influences wear procedure since constituent, for example, incorporations, intermetallics, and scattered phases have properties not quite the same as those of the matrix. The most imperative part of the microstructure is the distribution of second phase particles [3].

AMCs are majorly impacted by the characters of the matirx and reinforcement material. The worn surface of the material, in dry sliding wear, is subjected to considerable work hardening. The layer, mechanically mixed layer (MML) is produced during wear of aluminum alloys, sliding against ferrous alloy. Due to the shift and combination of materials, under definite load and velocity range, MML is formed. The generated MML consists of materials from both contact surfaces. It was also reported that the hardness of the generated MML is greater than the bulk hardness of the composite. The generated MML is majorly responsible for the decrement of wear rate and holding–up of transition to severe wear.

The literature survey gives the survey of the published material accessible on the influence of different types of

Experimental investigation on wear process parameters of magnesium metal matrix composites using Taguchi method

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Abstract : The present study examines the influence of wear parameters such as sliding speed, load applied and sintering temperature on dry sliding wear of silicon carbide (10 wt%) and alumina (10 wt%) particles reinforced magnesium metal matrix composites. The design of experiment approach was employed to acquire data using Taguchi technique in a controlled manner. The dry sliding wear test was carried out using a pin - on - disk apparatus., signal-to-noise ratio, orthogonal array and analysis of variance were used to determine the wear behavior of magnesium MMC's. It was determined that applied load was the most significant parameter influencing the wear rate followed by sliding and sintering temperature.

Keywords **- Magnesium MMC's, Wear rate, Orthogonal Array, ANOVA, Taguchi Method.**

I. INTRODUCTION

Metal - matrix composites (MMCs) are increasingly being used in many of today's industries. In particular, the aluminum based mmc's are recommended their use in many components of automotive and aerospace due to the high specific strength and stiffness. Wear - resistant ceramic - reinforced Al MMCs were also used in automobile components such as, piston rings, brake rotors and cylinder liners. However, the persistent effort by the aerospace and automotive sectors to push performance limits consistently challenge the vital issue of weight reduction. Magnesium (Mg), which has a density of about two - thirds that of aluminum, is the lightest metal structural material. In the future, magnesium - based MMCs would provide attractive alternatives to Al MMCs.

The Taguchi technique is a powerful experimental tool designed to acquire data in a controlled manner and analyze the influence of process variable over certain specific variable that is unknown to these process variables and to design high-quality systems. Researchers successfully used this method in the study of wear behaviour of metal matrix composites. The objective of this technique is to make the products robust in terms of parameters influencing. Taguchi creates a standard orthogonal array to accommodate the effect on the target value of several factors and defines the experiment plan. To study the influence of parameters, the experimental results are analyzed using analysis of means and variance.

Magnesium metal matrix composites are designed to combine the important properties of ceramics and metals. However, the development of better quality of metal matrix composites has some restrictions. The achievement of an excellent bond between metal matrix and reinforcement particles is one of the major challenge.

II. MATERIALS AND METHODS

In the present work, alumina (10 wt%) and silicon carbide (10 wt%) were added to magnesium metal. Powder metallurgy technique was employed for fabrication of composites. Basic steps in powder metallurgy process like blending of powders, compaction and sintering were carried out for each specimen. The composites were prepared from pure magnesium (99.7%) powder, high purity silicon carbide and alumina powders. powders were blended in a ball mill apparatus and poured into a die cavity. Then these powders are compacted in a universal testing machine at high pressure. the obtained green compacts were sintered in a furnace at a temperature 500^{o}, 530^{o} and 550^{o}C. These composites were then cut into small pieces and machined for wear testing purposes to the required pin diameter of 10 mm and length of 30 mm. Using emery paper of 400, 600 and 1000 grade, polishing was done for all pins before wearing testing. The counter surface disc was cleaned with acetone before conducting the wear test. The pin samples obtained after being machined and polished have been cleaned with acetone and a digital weighing scale is used to weigh samples. Then the pin sample was held and pressed during the test against the rotating steel disk as shown in fig 1. The pin sample was weighed again at the end of each test.

The experiments were conducted as per the standard L9 orthogonal array for various parameters. The parameters selected for the experiment were Load in N, sliding speed in rpm and sintering temperature in ^{o}C. The each parameter was assigned three levels which are shown in Table 1. As shown in Table 2, the standard L9 orthogonal array consists of nine tests. The first column is assigned by applied load, second column was assigned by sliding speed and third column was assigned by sintering temperature. The response studied was wear in terms of grams with the goal of quality characteristic “smaller is the better” type.

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WEAR PERFORMANCE OF MG-5%SIC-5%AL_2O_3 METAL MATRIX COMPOSITES USING TAGUCHI METHOD

Satish J*

Dr. K. G. Satish**

Abstract

The present study deals with investigations relating to dry sliding wear behaviour of the Magnesium metal matrix composites, reinforced with Silicon carbide (SiC) and Alumina (Al_2O_3). The hybrid composites are produced through Powder metallurgy method. The amount of SiC and Al2O3 particles 5 wt%. Experiments were carried out on the basis of the experimental plan generated by Taguchi's technique. A L9 Orthogonal array was selected for analysis of the data. The investigation is to determine the effect of applied load, sliding speed and sintering temperature on wear rate of magnesium metal matrix composites and to find the optimum parameters to achieve the minimum wear rate.

Keywords:

Magnesium MMC's;

Wear rate;

Orthogonal Array;

ANOVA;

Taguchi Method.

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Effect of Sintering Temperature, Load and Sliding speed on the Wear behavior of Mg–SiC-Al_2O_3 metal matrix Composites using Taguchi method

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Abstract- In the present study, Powder metallurgy method is used to fabricate Magnesium metal matrix composites (MMCs) having Silicon carbide (SiC) and Alumina (Al_2O_3) in 15 wt%. The dry sliding wear tests were carried out on composite material using a pin-on-disc wear testing apparatus with a normal pin load of 19.62N, 39.24N and 58.86N, and wear rate for each load is calculated for different sliding speeds. By using Taguchi's design of experiments (DOE) Analytical modelling of composite material is performed with L9 orthogonal array. Analysis of Variance (ANOVA) has been used to find out the design parameters that significantly affect the composite material's wear rate. A linear regression model has been developed based on the experimental results. The resulting regression equation establishes a relationship between the significant terms obtained from ANOVA, namely applied load, sliding speed, sintering temperature and their relations.

Index Terms- Magnesium; Metal matrix composites; Taguchi; Dry sliding; Wear;

1. INTRODUCTION

Many of our recent technologies have need of materials with unusual combinations of properties that cannot be met by the conventional metal, ceramics, alloys, and polymeric materials. This applies in particular to materials needed for applications in aerospace, underwater and transportation. Strong materials are often relatively dense; in addition, they generally increase strength or rigidity [1]. Generally speaking, a composite is measured to be any multi-phase material that exhibits a significant proportion of the property of both constituent phases in order to achieve a better combination of properties. According to this standard of combined action, improved property combinations are shaped by the sensible combination of two or more distinct materials [2].

In metal-matrix composites (MMCs) the matrix is a metal. These materials can be used at higher service temperatures than their base metal counterparts; in addition, reinforcement can improve specific strength, specific stiffness, creep resistance, wear resistance, dimensional stability and thermal conductivity [8]. The Purpose of manufacturing metal matrix composite is to combine the significant properties of metals and ceramics. The function of the reinforcement in a composite material is essentially one of increasing the mechanical properties of the neat resin system. All of the different fibres / particulates used in composites have different properties and so affect the properties of the composite in various ways [12].

In this experimental work, magnesium metal matrix composites have been prepared by utilizing powder metallurgy process having 15 wt% SiC and 15 wt% Al_2O_3 and wear performance was examined with three process variables viz. applied load, sliding speed and sintering temperature in accordance with taguchi orthogonal array.

2. DEVELOPMENT OF MG - MMC'S

In this experimental work, magnesium is used as a base metal available in the form of a powder. Silicon carbide (SiC) and Alumina (Al_2O_3) was used as a reinforcement for the fabrication of composite. Silicon carbide and alumina are very hard and strong material and were used in many applications as an abrasive. The powder metallurgy process has been utilized for the development of magnesium metal matrix composites. The composites were prepared from powdered pure magnesium, high purity silicon carbide and powdered alumina. In a ball milling machine, powders were mixed and poured into a die cavity. These powders are then compacted at high pressure in a universal testing machine as shown in fig 1. The green compacts obtained were sintered in a furnace at 500 ° C, 530 ° C and 550 ° C. Wear tests on composite specimens were performed on the pin-on-disk wear testing machine in dry sliding states. The circular pin type test samples of size diameter 10mm and length 30mm were pressed against the counter rotating disc. Before wear examination began, the samples to be examined were finely polished to make a flat face and grabbed against the rotating counter-face disc. In accordance with the taguchi L9 orthogonal array design matrix, the composite specimens were subjected to dry sliding wear tests at room temperature. After each run, the samples and the rotating disk were polished to acquire error free data. The experiments were conducted for different parameters according to the standard L9 orthogonal array. Load in N, sliding speed in rpm and sintering temperature in ^oC were the parameters selected for the

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Hybrid Non Conventional Machining of Glass - A Review

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Keywords: non conventional machining, material removal rate, heat affected zone, surface finish, tool wear

Abstract. Glass, being considered as hard and brittle material is very difficult to machine into desired shapes. The readily available conventional machining process does not provide good surface finish thus requires additional machining process. This paper reviews the different existing non conventional machining process accessible till today for the machining of glass materials. This paper also discusses the advantages and disadvantages of the existing non conventional machining processes. The various hybrid non conventional machining processes are also studied with focus on machining output characteristics like MRR, surface finish, tool wear rate. This paper summarizes the selection of hybrid non conventional machining processes for the various type of glass.

1. Introduction

In modern machining practice, harder, stronger, and tougher materials that are more difficult to cut are frequently used. Advance machining techniques are developed to fabricate hard to machine materials with excellent material properties.Traditional machining of such materials creates high cutting forces that, in some cases may not be maintained by the workpiece. Conventional cutting tools with conventional methods are used to cut the hard and brittle materials such as glass where scratches were observed on the surface. In this regard, the nonconventional machining techniques came into practice as a possible alternative concerning machinability, shape complexity, surface integrity, and miniaturization requirements. Innovative machining techniques or modifications to the existing method by combining different machining processes are also developed. The brittle and non conducting materials such as ceramics, glasses/quartz and oxide single crystals are find increasing applications in advanced micro-engineering products. Machining of small features in such materials represents a manufacturing challenge. Material Removal Rate (MRR) is one of the most important characteristics in non conventional machining. It is a challenging task for the researchers to improve the performance of non conventional machining processes. In view of this, the researchers had proposed to combine more than one non-conventional machining process known as Hybrid machining process. This paper discusses some of the hybrid non conventional machining processes.

2. Materials and Methods

2.1 Ultrasonic Machining (USM)

Ultrasonic machining, also known as ultrasonic vibration machining is one of the most advanced and effective mean for the machining of glass or ceramic. However due to its multifaceted nature, the process of the rate of material removal is very slow and difficult to understand. Further, the process parameters cannot be optimized effectively. To increase the rate of material removal using the ultrasonic machining J.P. Choi et al. [1] reported a novel hybrid machining method called as the Chemical- Assisted Ultrasonic Machining (CUSM) where the glass is dipped in the low concentration chemical solution (hydrofluoric acid) to reduce the intermolecular force thereby weakening the surface area. Dae et al. [2] reported a novel technique to produce a crack free surface

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Optimization of Machining Parameters on Surface RoughnessUsing Taguchi Technique and ANOVA

Chiranth H J, Jagannatha N., Sathisha N.

Abstract

Surface roughness is the extremely specified requirement in a machining process. For effectual use of machine tools, optimum cutting parameters are essential. Therefore, it is required to find the optimum values of cutting parameters for minimizing surface roughness. In this paper, a bestir has been made to optimize the process parameters using Taguchi technique and ANOVA to study the factors influencing surface roughness. The experiments were conducted on austempered steel when coolant is off and on. The major impacts on the surface roughness in turning process such as spindle speed, feed rate and depth of cut were considered as inputs and surface roughness as output by some of the machining variables. Micrographic analysis is performed to study the effect of parameters on roughness of machined surface. The results were compared when coolant is off and on.

Keywords

ANOVA; Micrographs; Surface roughness(Ra); Taguchi technique; Turning operation

Full Text:

PDF

References

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Title:	Influence of titanium carbide and activated carbon particles on the wear, mechanical properties and microstructure study of A413 metal matrix composite
Authors:	Manohara, Hireguntanur Rajanna Thipperudrappa, Nagaraja Basava Thippeshappa, Sridhara
Keywords:	TiC;AC;Al-Si matrix;Wear;Mechanical properties
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Abstract:	Present industries show an increasing demand in low-cost reinforcement and light weight composites. As compared to unreinforced alloys, metal matrix composites (MMCs) have possessed better properties including good thermal conductivity, wear resistance and high strength. The inexpensive low-density reinforcement of several discontinuous dispersions is available in huge quantities of agricultural waste is activated carbon (AC). Hence, the composites with activated carbon as reinforcement in Al-Si alloys (AMMC) are likely to find wide spread applications in aerospace, marine and automobile sectors. The current examination has been cantered at the usage of titanium carbide (TiC) and activated carbon (coconut shell ash powder) in micro form, with the aid of dispersing it into aluminium silicon alloy (A413) to yield composites *via* stir casting method. Hybrid reinforcement of 1, 2 & 3% of TiC and 5, 10 & 15 % of activated carbon *via* weight %, specimens have been prepared by using liquid metallurgy route. Tests like wear behaviour, mechanical tests and microstructure studies are executed and analysed. From the investigation it has been revealed that with increase in the % reinforcements of TiC and activated carbon improving the mechanical properties of the composites such as hardness and tensile strength. The microstructure pictures have revealed the distribution of TiC and AC reinforcement uniformly in the Al-Si matrix.
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EFFECT OF ADDITION OF SIC AND AL_2O_3 ON WEAR BEHAVIOR OF HYBRID ALUMINUM METAL MATRIX COMPOSITES

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Abstract: In the present investigations, wear test is conducted on pin on disc device at room temperature for both the age hardening and without age hardening conditions. Al7075 has chosen as the matrix material. HMMCs are produced utilizing stir casting route for enhancing the wear behavior and hardness number. The reinforcement used is silicon carbide with 5%, 10% and 15% weight percentage and Al_2O_3 as the reinforcement in 5%, 10% and 15% weight percentage. In the aluminum matrix Microstructural characterization reveals the homogeneous mixing of reinforcements. This investigation shows the enhanced in wear resistance is due to the increment weight fraction of reinforcement. By raising the sliding speeds there is a reduction in the rate of wear and it reduces with increment in sliding distance. As an increase in weight fraction there is decrement in rate of wear of composites. In general tribological property enhances because of the addition of the two reinforcements.
Keywords: Al7075/SiC–Al_2O_3, Dry sliding wear, wear rare, HAMMCs

INTRODUCTION

MMCs comprise of an alloy or a metal as the matrix and a reinforcement such as the particles, short fibre or whisker and/or long fibre. MMCs were a group of material with perspective for a broad collection of applications in structural management. Their properties such as light in weight, superior strength and resistance to wear are the requirement for the aviation and automobile industries.

Discontinuously reinforced MMCs are much less expensive to fabricate than continuously reinforced composites. Consequently, performance enhancement of the matrix comes at lower additional costs with discontinuous reinforcements compared with aligned reinforcements. Particulate reinforced MMCs are not expensive to manufacture than reinforced composites. Accordingly, performance improvement of the matrix comes at lesser expenses with particulate reinforcements compared with fiber aligned reinforcements. In addition, particulate reinforced composites exhibit the isotropic properties [1], whereas the properties of composites with fiber aligned reinforcements are highly anisotropic.

Hybrid aluminum metal matrix composite (HAMMC) materials are an excellent substitute to conventional materials, because of the enhanced hardness, specific strength and creep resistance properties. Based on the literature survey made, one can consider the Al7075–SiC/alumina particulate MMC for automobile applications such as: pistons, cam shafts, brake components, Bearing surfaces, cylinder liners, etc., and aerospace applications such as wing and fuselage (main body) of aircraft structure, internal aerospace engine components, exhaust systems.

A surface phenomenon referred as wear will occurs by relocation & separation of material. It generally suggests a progressive loss of material and change of measurements over some undefined time frame.

The principle tribological considerations that manage the wear and friction properties of discontinuously reinforced aluminium (DRA) composite can be categorized into two types (i) Mechanical and physical properties: such as loads, speeds, surface finish, sliding distance, orientation of reinforcement, temperature and environment etc. (ii) Material factors: for instance the type, size, and size distribution, shape, reinforcement's weight fraction, and the matrix microstructure [2].

The important parameter which influences the wear of materials is the microstructure. According to research reports, microstructure and mechanical properties have a correlation. On the other hand, to relate the wear techniques with microstructural characteristics only limited reports were used. The wear surface exhibits microstructural heterogeneity which influences wear procedure since constituent, for example, incorporations, intermetallics, and scattered phases have properties not quite the same as those of the matrix. The most imperative part of the microstructure is the distribution of second phase particles [3].

AMCs are majorly impacted by the characters of the matirx and reinforcement material. The worn surface of the material, in dry sliding wear, is subjected to considerable work hardening. The layer, mechanically mixed layer (MML) is produced during wear of aluminum alloys, sliding against ferrous alloy. Due to the shift and combination of materials, under definite load and velocity range, MML is formed. The generated MML consists of materials from both contact surfaces. It was also reported that the hardness of the generated MML is greater than the bulk hardness of the composite. The generated MML is majorly responsible for the decrement of wear rate and holding–up of transition to severe wear.

The literature survey gives the survey of the published material accessible on the influence of different types of

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Corrosion behaviour of metal complexes of antipyrine based azo dye ligand for soft-cast steel in 1 M hydrochloric acid

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ABSTRACT

In this communication the corrosion behaviour of three metal [Co(II), Ni (II) and Fe (III)] complexes of Antipyrine based azo dye ligand [5-[(1,5-dimethyl-3-oxo-2-phenyl-2,3-dihydro-1*H*-pyrazol-4-yl)diazenyl]-6-hydroxy-1,4-dimethyl-2-oxo-1,2-dihydropyridine-3-carbonitrile](L) for soft-cast steel in 1 M hydrochloric acid solution was discussed by experimental and theoretical methods. The study reveals that the ligand and their metal complexes show good inhibition efficiency. Here Ni complex shows significant inhibition efficiency at an optimized concentration of 25 mg/L. The quantum studies strengthen the experimental results of capacity of the ligand and their metal complexes acts as corrosion inhibitors for soft-cast steel in 1 M hydrochloric acid.

1. Introduction

Soft-cast steel is a significant alloy of iron because of its superior mechanical and thermal stability. Therefore, it can be used in construction and industrial fields. Unfortunately, soft-cast steel undergoes corrosion when came into contact with acids or alkalis in various industrial applications. The addition of inhibitors is the convenient practical method to develop the corrosion inhibitors especially in acid solutions (Issaadi et al., 2011; Nathan, 1997). Furthermore, electron donating atoms such as nitrogen, oxygen, sulphur and the presence of π electrons associated with heterocyclic rings in the molecules were reported as effective corrosion inhibitors for soft-cast steel in hydrochloric acid solution (Behpour et al., 2009; Behpor et al., 2008). From the scientific literature, the inhibitive capacity of the molecule is attributed caused by the adsorption on surface of the metal from bulk solution. Therefore, the corrosion study of metal complexes of ligand for soft-cast steel in acidic solution appeared in the earlier works are particularly inadequate (Rangelov and Mircheva, 1996; Khaled et al., 2006).

The present investigation is the study of corrosion inhibition effect of ligands and their metal complexes as corrosion inhibitors for soft cast steel in 1 M HCl was evaluated by experimental techniques. Therefore, experimental used for this study are electrochemical impedance spectroscopy and Tafel's polarization measurements. Hence, due to the lack of information in earlier works on corrosion inhibitive study of ligands and their metal complexes, there is needed to explicate a probable mechanism for the corrosion inhibition investigation. Quantum chemical parameters are deciding the probability of inhibitive effect of corrosion inhibitors by theoretically through its molecular orbitals, molecular geometry optimization, and energy calculations.

2. Experimental

2.1. Materials

The corrosion parameters for the selected inhibitors (ligand and their metal complexes) for different steel strips were used for weight loss measurements. And the same steel strip, which is used in weight loss measurement, was used for electrochemical measurements with an uncovered area of 1 cm^2 (the remaining area was shielded by epoxy resin). The soft-cast steel strips were clean and rubbed by SiC emery paper (grade no 2000), and washed with deionised water. The analytical grade 1 M hydrochloric acid is used to prepare the corrosive media.

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Synthesis, characterisation and molecular structure study of metal complexes of antipyrine based ligand

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ABSTRACT

Three transition metal complexes [Co (II), Ni (II) and Fe (III)] of the ligand 5-[(1,5-dimethyl-3-oxo-2-phenyl-2,3-dihydro-1*H*-pyrazol-4-yl)diazenyl]-6-hydroxy-1,4-dimethyl-2-oxo-1,2-dihydropyridine-3-carbonitrile(L) which was found from the diazo-coupling reaction below 5 °C. The freshly synthesized metal chelates were characterized by both experimental and theoretical studies. Based on physico-chemical evidence, the azo dye acts as a tridentate ligand with nitrogen and oxygen atoms of the azo, carbonyl and phenyl groups are the coordinating sites. Non-electrolytic nature was observed for all the metal chelates because of their low molar conductivity. The electronic and magnetic susceptibility measurements suggested octahedral geometrical environment around all the metal ions. Quantum study of the synthesized moleculesby Zindo method to explaining about the electronic structure of the molecules.

1. Introduction

Azo colorants are the utmost significant class of organic chemistry due its variety of applications in paint, electrical, optical, pharmaceutical industries. Many of the dyes are available in the market but azo dyes comprise of about 60–70% of its usage due to their quite interesting applications [1,2]. The azo dyes showing excellent physio-chemical properties such as high sensitivity, good storability, thermal stability and therefore they are the major starting materials in the design of optical storage materials, photo switches, and food colorants [3–5]. Azo dyes possessing heterocyclic components exhibit significantly enhanced properties due to their extensive conjugation and freely available lone pair of electrons. Further, metal ions in the heterocyclic azo dyes played crucial role in exploring good thermal, electrical, photochemical and biological applications [6]. In the present study, we tried to synthesize certain metal complexes obtained from azo dye ligand having pyridone nucleus [7]. Quantum methods is use to design the molecule and their structure through the electron distribution for different molecular geometries. Electronic spectra, Vibrational spectra, Molecular geometry optimization, and Energies calculations were discussed for the synthesized metal chelates of ligand.

The current effort is goals to explain the synthesis, characterisation and quantum study for synthesized novel Antipyrine based ligand and their metal chelates such as Co (II), Ni (II) and Fe (III).

2. Experimental

2.1. Material and methods

The procurement of chemicals were done from Aldrich Pvt. India Ltd and used without further purification and the solvents were freshly purified by standard methods. The purity of the novel metal chelates of ligand was checked through thin layer chromatography (TLC). The coupler compound 6-hydroxy-1, 4-dimethyl-2-oxo-1, 2-dihydropyridine-3-carbonitrile was synthesized as per the literature [8].

2.1.1. Synthesis of azo dye ligand

A solution of 2 m mol 4-amino-antipyrine (**1**)in 5 cm^3 of concentrated hydrochloric acid was chilled in an ice bath with constant stirring. The sample was diazotized with the addition of 2.2 m mol sodium nitrite in 2 cm^3 of concentrated sulphuric acid.

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RESEARCH ARTICLE OPEN ACCESS

Dry Sliding Wear Behavior and Evaluation of Mechanical Properties of AA6061-B_4C Composites

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ABSTRACT : *The Paper reports a study on the processing and evaluation of Wear behavior and mechanical properties of AA6061 alloy reinforced with B_4C particulates of having average particle size of 220 µm with varying weight percentage of 1%, 2%, 3% & 4% by liquid metallurgical route. Bi potassium hexa flouro titanate (K_2TiF_6) flux is added to incorporate boron carbide into aluminium melt and to enhance better wettability of B_4C particles in the matrix. To study the microstructure of the prepared composites scanning electron microscope (SEM) equipped with an energy dispersive X- ray analysis (EDAX) were used. SEM micrographs reveal the homogeneous dispersion of B_4C particles in the matrix. The reinforcement dispersion has also been identified with X-ray diffraction (XRD). The wear properties of the samples were studied using pin-on disk apparatus. Worn surface were characterized by SEM to understand the wear mechanism exhibited by the prepared composites. The results indicates that adding B_4C particulates in AA6061 matrix increases the Wear resistance, hardness and ultimate tensile strength.*
Keywords *- AA6061, B_4C, EDAX, SEM, XRD.*

I. INTRODUCTION

The importance of composites as engineering materials is reflected by the fact that out of over 1600 engineering materials available in the market today more than 200 are composites because of their excellent behaviour with their high strength to weight ratio. Conventional monolithic materials have limitations with respect to achievable combinations of strength, stiffness, and density. In order to overcome these shortcomings and to meet the ever increasing engineering demands of modern technology, metal matrix composites are gaining importance [1, 5].

Aluminium matrix composites (AMMCs) are attractive and competent materials for military, marine, space, nuclear, automotive and aircraft industries because of its excellent tribological and mechanical properties. Due to vast market needs there is huge interest and demand in research and development on aluminium metal matrix composites.

In AMMCCs, the major constituent is aluminium alloy, which acts as the matrix phase. The other constituent embedded in the aluminium alloy matrix which serves as reinforcement are usually non-metallic, and commonly include ceramics such as silicon carbide, aluminium oxide etc.

The major advantages of AMMCs compared to unreinforced materials are greater strength, improved stiffness, reduced weight, improved high temperature properties, controlled thermal expansion coefficient, thermal/heat management, enhanced and tailored electrical performance, improved abrasion and wear resistance as well as improved damping capabilities [5, 10]. Properties of AMMCs can be tailored by varying the type, size of constituents and percentage of reinforcement.

Particulate Reinforced Aluminium Metal Matrix Composites are much less expensive to fabricate than continuously reinforced composites. Consequently, performance enhancement of the matrix comes at lower additional costs in comparison to composites with aligned reinforcements. Silicon carbide, alumina, boron carbide, and graphite are common reinforcements for aluminium matrices [10, 16].

Boron carbide is the third hardest material after diamond and cubic boron nitride, which possesses low density (2.51 g/cm3), high hardness (3700 N/mm2), high stiffness (445 Gpa), high specific strength, high strength, high shock resistance, high wear and impact resistance, high toughness, has a relatively low fracture toughness, low specific weight, low specific gravity [17, 20]. Boron carbide has high melting point (2450 ºC) as well as high resistance to chemical agents. It is an attractive strengthening agent for aluminium-based composites. One of the special features of boron carbide is that the ability to absorb neutron is considerably high. These features allowed boron carbide to be applied in nuclear industry as neutron absorber materials. Aluminium reinforced boron

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Processing and Evaluation of Mechanical Properties and Dry Sliding Wear Behavior of AA6061-B_4C Composites

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Abstract

The Paper reports a study on the processing and evaluation of Wear behavior and mechanical properties of AA6061 alloy reinforced with B_4C particulates of having average particle size of 220 µm with varying weight percentage of 1%, 2%, 3% & 4% by liquid metallurgical route. Bi potassium hexa flouro titanate (K_2TiF_6) flux is added to incorporate boron carbide into aluminium melt and to enhance better wettability of B_4C particles in the matrix. To study the microstructure of the prepared composites scanning electron microscope (SEM) equipped with an energy dispersive X- ray analysis (EDAX) were used. SEM micrographs reveal the homogeneous dispersion of B_4C particles in the matrix. The reinforcement dispersion has also been identified with X-ray diffraction (XRD). The wear properties of the samples were studied using pin-on disk apparatus. Worn surface were characterized by SEM to understand the wear mechanism exhibited by the prepared composites. The results indicates that adding B_4C particulates in AA6061 matrix increases the Wear resistance, hardness and ultimate tensile strength.

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Mathematical Modeling of Sliding Mode Reaching Laws for Buck Converter

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Abstract: In this paper, the load and line variations are analyzed for Sliding Mode reaching laws. Mathematical modeling has been done for all proposed sliding mode reaching laws, they are Exponential reaching law, Sigmoid reaching law, Tan hyperbolic, Robust reaching law, Improved tan hyperbolic reaching law and Double power reaching law. SMC has less sensitive for load and line disturbances. SMC (Sliding Mode Control) gives sensitive for load and line mutations due to chattering phenomenon. The comparative analyses for these reaching laws have been tested in buck converter. Chattering of all reaching laws are depicted. Among these reaching laws, tan hyperbolic reaching law gives efficient and insensitive for line and load mutations, even for parametric uncertainties and simulation results are validated through MATLAB/Simulink

Keywords: Tanhyperbolic reaching law, buck converter, Double power reaching law, Robust reaching law, Sigmoid reaching law

I. INTRODUCTION

Variables structure system is applied for nonlinear circuits.SMC(sliding mode control) is part of the variables structure system[1].DC-DC buck converter is implemented and controlled by SMC, because SMC is suitable for power electric systems[2] and the fastest switching operation has been done in power electronics systems[3]. Know days usage of electronic gadgets are more. The chattering is the undesirable phenomenon occurs in the power converters due to switching operation and lack of designing closed-loop systems[4]. The DC-DC power converters to obtain smooth and fast operation and less steady error, it requires a dynamic controller for efficient operations [2, 5]. In some research work dc-dc buck converter controlled by classical SMC, chattering is not focused. The chattering is minimized to some extent [6]. The steady-state error is minimized effectively. Global SMC minimized the steady-state error and chattering minimized considerably. Reaching law is implemented but chattering existing on the sliding line, so that steady state error not accurate using reaching law[7]. In some researchers modified SMC functional to dc-dc power converter to obtain a smooth and less steady-state error even for external disturbances occurs [8,9]. To overcome the drawbacks of the chattering in SMC, and minimizing the steady-state errors and a stable output voltage. Proposed techniques are adopted buck converter and among them, tan hyperbolic reaching law gives steady-state output voltage even for external disturbances.

II. SLIDING MODE CONTROL FOR BUCK CONVERTER

The sliding mode controlled buck converter as shown in figure [10].

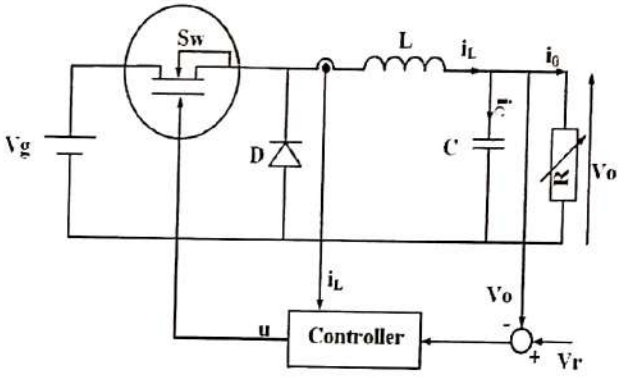

Figure1. A Circuit diagram of SMC for converter.

State equations

$$Xbuck = \begin{pmatrix} X1 \\ X2 \\ X3 \end{pmatrix} = \begin{pmatrix} X1 = Vref - \beta Vo \\ X2 = \frac{\beta Vo}{RLC} + \int \frac{\beta Vo - \beta ViU}{LC} dt \\ X3 = \int X1 dt \end{pmatrix} \quad [10]$$

$$\dot{X} = AX + BU + D \quad (1)$$

X_1 is the error, X_2 is the derivative of the error and X_3 is the integral error.

The sliding surface is given by

$$S = \alpha 1X1 + \alpha 2X2 + \alpha 3X3 \quad (2)$$

The derivative of the sliding surface as

$$\dot{S} = \alpha 1\dot{X}1 + \alpha 2\dot{X}2 + \alpha 3\dot{X}3 = 0 \ [10] \quad (3)$$

Where α1 α2 & α3 are constants.

Chattering: It is undesirable or unwanted oscillation occurs in the sliding surface of SMC.Fig.1 depicts the chattering of SMC.

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Robust Reaching Law for Chattering Mitigation in Sliding Mode Controlled DC-DC Buck Converter

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Abstract--- The new robust reaching law based sliding mode control is used for chattering suppression, minimization of steady state error and reaching speed kept minimsed. Here saturation function is used instead of signup function. With fine tuning of parameters of reaching law, the sliding mode reaches the equilibrium point at the earliest. The immovability of the proposed reaching law is analyzed with Lyapunov stability. In one hand, they promise the system attain the sliding surface quickly and stay on it, in another way they decline the chattering successfully, even unmatched certainties' and disturbances. Such that the scheme reply can better realize the unification of rapidity. The robust reaching law is compared with traditional reaching law. A proposed reaching law applied to SMC DC-DC buck converter to reduce chattering, because switching devices exist in the model, it reduces the switching losses in the switching devices of the dc-dc converter. In turns efficiency of the buck converter increases. MATLAB Simulation results gives significant reduction of chattering by robust reaching law compared to constant plus proportional pace reaching law and very less sensitive on line and load variation Feature work of this article be to apply solar power stations

Index Terms--- Variable Structure System, Buck Converter, Chattering, Sliding Mode Control, Robust Reaching Law, Reaching Law.

I. Introduction

Sliding Mode Control (SMC) is a nonlinear control systems design technique which is robust next to parameter variations and matched uncertainties. It evolved from the Variable Structure Control (VSC) and is established in the field of nonlinear control. Sliding mode control can be implemented to various control applications and drawbacks of the control, methods of reaching sliding surfaces, various sliding surfaces that can be explained and can be connected through sliding mode variable in [1][2]. Sliding Mode Control a reaching law takes the system states in the sliding surface at finite time interval. Once the state of the system arrives the sliding line the switching control causes chattering in [3]. The chattering frequency is infinite and its amplitude towards zero. However, in practical systems due to the dynamics of the Electrical plant, Electronics sensors and actuators etc., the chattering frequency is finite and also has some amplitude in [4]. In mechanical systems this can result in high wear and tear losses, as a consequence becoming infeasible for use in such systems, on the previous dispense in high speed electronics it can result in huge variations the steady state performance resulting in unacceptable systems. a number of methods have been proposed in various research works for mitigating the chattering effect In[5].VSC along with non sliding methods were used for eliminating the high frequencies by achieving the elimination of chattering In [6]. Tuned sigmoid functions were implemented to weaken the chattering. In[7], power pace reaching law was implemented for the mitigation of chattering. But it fails to give convergence speed, 2nd order sliding mode wakened the chattering in [8] [9]. Smooth Sliding Mode is expressed and mitigating the chattering, it was not considered robust against the parameter variations and matched uncertainties [10][11]. A disturbance estimator was to withdraw out the glide terms, which amplified the complication of the soft sliding mode control in [12]. The different reaching law structures explained that chattering alleviation and convergence speed ,minimization of steady sate errors, robustness explained in [13][14]. However, the further application of SMC is limited because of the chattering phenomenon, which can excite high frequency dynamics. Thus, some techniques have been planned to conquer this problem. Control method can solve this problem effectively. Although this method could restraint the high-frequency chattering, it also destroys the sliding mode in [15].Another method of restraining chattering is higher order sliding mode control, which can eliminate the discontinuous term in control input in [16]. the reaching law technique which is used to chattering mitigation can obtain the control law easily, exponential reaching law, system takes more time to reach the steady state and reduces reaching time faster convergence speed in[17][18].continuous approximation in sliding mode control can be explained

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