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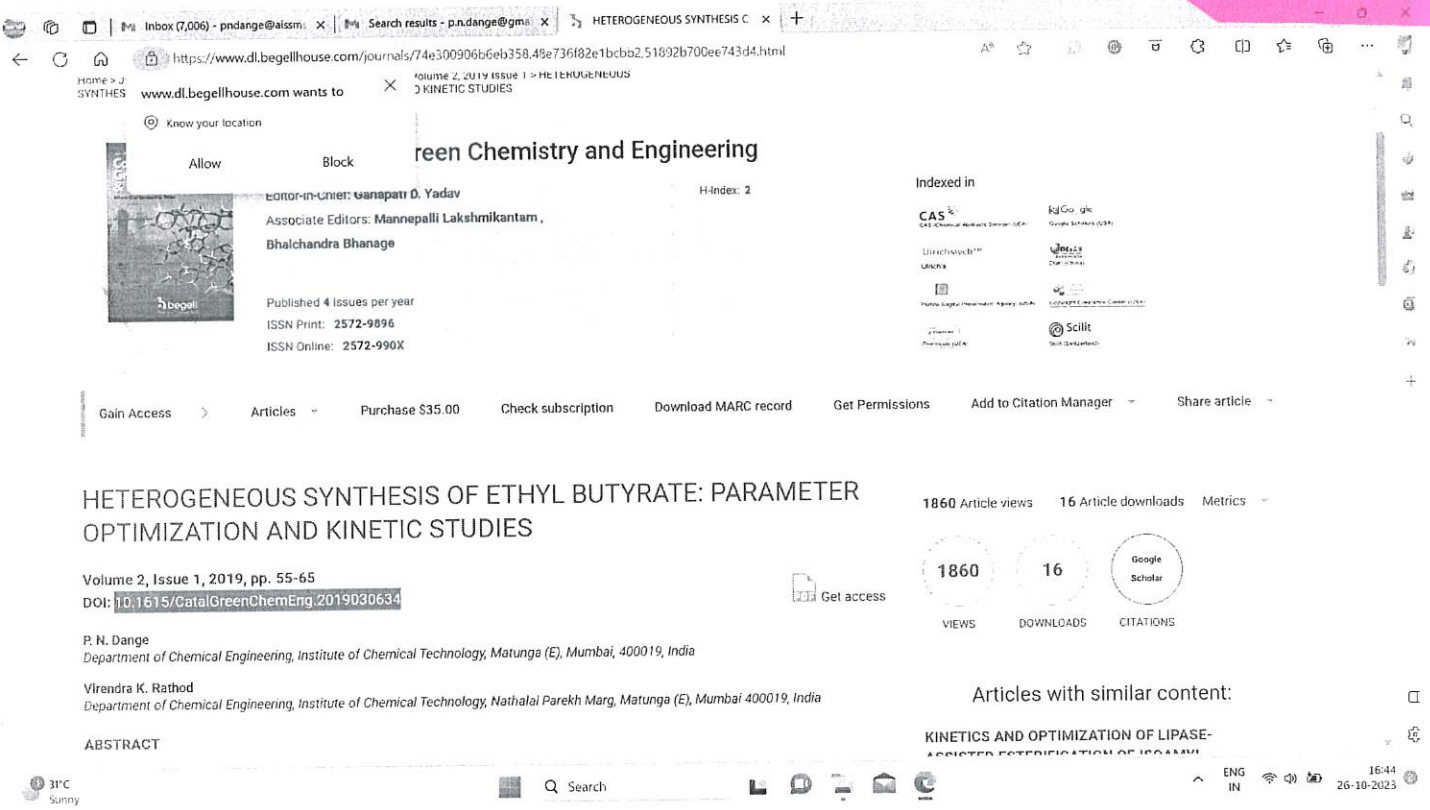

HETEROGENEOUS SYNTHESIS OF ETHYL BUTYRATE: PARAMETER OPTIMIZATION AND KINETIC STUDIES

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ABSTRACT

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Vol. 96, August 2019, pp. 1067-1074

Ferets diameter estimation of activated carbon for effluent treatment application

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In this paper, activated carbon was produced of by chemical activation with phosphoric acid of agricultural wastes such as *Arecanut shell* of 25 micronmeter at 400°C by slow pyrolysis. The BET surface area and iodine number surface area is calculated and compared. The FTIR spectra show the presence of activated carbon. The TGA revealed, activated carbon is thermally stable at 480°C. The SEM shows the incorporation of activated carbon particles leads to the systematic change in morphology of activated carbon. Surface area plot shows the details of morphological change caused by iodine number surface area. Ferets diameter is estimated to know circularity of the particle. Methylene blue number, acid adsorption value is calculated to know adsorption capacity of the carbon. Thus results proves selection of ferets diameter, activation temperature, and impregnation ratio is important in determining the quality of activated carbon obtained and its use in industrial waste water treatment.

Keywords: *Arecanut shell*, activated carbon, phosphoric acid, feret diameter.

Introduction

Arecanut shell is not a consumable part and is usually discarded as waste. *Arecanut shell* has become important species since its demand for export has increased tremendously. To make better use of cheap and abundant agricultural waste, it is proposed to convert *Arecanut shell* waste into activated carbon. This conversion will address problems of unwanted agricultural wastes been converted into useful, value-added adsorbent and also the use of agriculture by-products to represent potential source of filler which will largely address problems of waste management. However, not many studies have been reported on converting *Arecanut shell* into activated carbon. In the present study, the optimal experimental conditions required to obtain adequate activated carbon with desirable properties in terms of carbon yield, BET surface area, iodine number surface area and ash content, methylene blue number, iodine number, ferets diameter which is critical in determining a good quality activated carbon is studied. A good quality activated carbon should have low ash content as possible[1], suggests that typical values of ash content should be in the range of 5–7% and about 85–90% for carbon content. As the carbon content of the activated carbon increase, the surface area also increases. High carbon content value is desired to achieve high surface area. Activated charcoal produced from residues would reduce the pressure on forests since wood is also commonly used for this purpose[2]. Many agricultural by-products such as coconut shell[3,4], grain sorghum[5], coffee bean husks[6], rubber wood sawdust[7], chestnut wood[8], have been discovered to be suitable precursors for activated carbon due to their high carbon and low ash contents. Agricultural wastes are considered to be a very important feedstock because of especially two facts: they are renewable sources and low cost materials. A considerable amount of such materials as waste by products are being generated through agricultural practices mainly from various agro based industries. Sadly, much of the agro waste

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RAPID METHOD FOR DETERMINATION OF NANO SURFACE AREA OF ARECANUT SHELL DERIVED ACTIVATED CARBON BY IODINE ADSORPTION NUMBER

Abstract. Activated carbon is the most versatile and commonly used adsorbent. Activated carbon is prepared for 5e+10ng , 1e+11ng, and 3e+11ng batch size. Impregnation ratio maintained is 1:1.2:1.3:1.4:1.Nano activated carbon from arecanut shell is derived. Particles size diameter maintained to 53000 nm. In this study the specific surface area determination of activated carbon by means of the low-temperature argon adsorption (the BET method) is compared with the measurement of the surface area based on the adsorption of I_2 from the aqueous KI solution. The iodine adsorption number for the BET surface area is calculated. It is predicted iodine adsorption number S_{IN} method can be used for a quick estimation of the structure development of porous carbonaceous materials.

Keywords: Activated carbons, Iodine adsorption number (S_{IN}), Specific surface area (S_{BET}).

1.Introduction

First of all, raw material of the activated carbon is acquired by collecting arecanut shell store from Bangalore and Kerala.Highly porous carbon can be produced from a variety of natural and synthetic precursors [1,2] In its original state, the surface of a carbon is energetically heterogeneous [3], but as discovered by Beebe et al. [4] the heterogeneity is considerably reduced by heat treatment in an inert atmosphere. Precursor used for the production of activated carbon in this study is arecanut shell Activated carbon produced from residues would reduce the pressure on forests since wood is also commonly used for this purpose [5]. Many agricultural by-products such as coconut shell [6,7], grain sorghum [8], coffee bean husks [9], rubber wood sawdust [10], chestnut wood [11], have been discovered to be suitable precursors for activated carbon due to their high carbon and low ash contents

2. Experimental

2.1 Preparation of activated carbon

The carbonization Arecanut shell biomass is performed under a nitrogen flow of 100 cm^3 min^{-1} STP for 2hr. After activation, the activated carbon product removed and subsequently cleaned by removing the fibers and washing several times with distilled water to remove impurities The arecanut shell is chopped to pieces of ¼ inches ,then dried at 110 ◦C until constant weight of the sample is reached.. Then, dried and size-reduced arecanut shell is kept in a muffle furnace as raw material for activated carbon production.

Chemical activation method using phosphoric acid is used to activate the raw material. 5e+10ng, 1e+11ng,and 3e+11ng of raw material is impregnated by certain amount of 85 wt.% concentration phosphoric acid with occasional stirring. The amount of phosphoric acid solution used is adjusted to give a certain impregnation ratio (weight of activating agent/weight of raw material) of 1:1, 2:1, 3:1, and 4:1. The resulting slurry is then kept in a desiccator Overnight .

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ORIGINAL PAPER

Co-gasification of High Ash Coal–Biomass Blends in a Fluidized Bed Gasifier: Experimental Study and Computational Intelligence-Based Modeling

Shishir Tiwary[2] · Suhas B. Ghugare[1] · Prakash D. Chavan[2] · Sujan Saha[2] · Sudipta Datta[2] · Gajanan Sahu[2] · Sanjeev S. Tambe[1]

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Abstract
Co-gasification (COG) is a clean-coal technology that uses a binary blend of coal and biomass for generating the product gas; it is environment-friendly since it emits lesser quantities of pollutants compared to the coal gasification process. Although coals found in many countries contain high percentages of ash, co-gasification studies involving such coals, and the process modeling thereof, are rare. Accordingly, this study presents results of the co-gasification experiments conducted in a fluidized-bed gasifier (FBG) pilot plant using as a feed the blends of high ash Indian coals with three biomasses, namely, *rice husk*, *press mud*, and *sawdust*. Since the underlying physicochemical phenomena are complex and nonlinear, modeling of the COG process has been performed using three computational intelligence (CI)-based methods namely, *genetic programming*, *artificial neural networks*, and *support vector regression*. Each of these formalisms was employed separately to develop models predicting four COG performance variables, namely, *total gas yield*, *carbon conversion efficiency*, *heating value of product gas*, and *cold gas efficiency*. All the CI-based models exhibit an excellent prediction accuracy and generalization performance. The co-gasification experiments and their modeling presented here for a pilot-plant FBG can be gainfully utilized in the efficient design and operation of the corresponding commercial scale co-gasifiers utilizing high ash coals.

Keywords Co-gasification · Fluidized bed gasifier · Computational intelligence · Genetic programming · Artificial neural networks · Support vector regression

Statement of Novelty

Gasification converts a solid organic fuel into a product gas possessing fuel value. Commonly employed coal gasification produces tar, sulphur, and ammonia as major pollutants. In comparison, co-gasification (COG) utilizing a blend of a coal and a biomass emits less pollutants. Accordingly, extensive experiments were conducted in a fluidized-bed co-gasifier using blends of high ash Indian coals, and three types of biomasses. Mathematical models greatly assist in designing and operating a process; thus, high performing models were developed using the state-of-the-art *computational intelligence* methods for predicting COG process performance. Although inferior in quality to low ash coals, high ash coals are available abundantly world-wide. Therefore, this study should be useful in designing and operating COG processes that use high ash coals.

Introduction

Coal is a commonly used, low-cost, and abundantly available fossil fuel. However, coal reserves are finite and depleting fast due to its prolonged utilization mainly for the production of electricity in thermal power stations. Coal's extensive use

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ORIGINAL CONTRIBUTION

Treatment of Methylene Blue Dye Using Immersed Lamp Photocatalytic Reactor: 5 L Scale Study

Pravin S. Tadkar[1] · Palas K. Borkar[1] · Sayali N. Gholap[1] · Vitthal L. Gole[1,2]

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Abstract The present investigation studied methylene blue dye treatment using 5-L immersed lamp photocatalytic (UV) reactor. Dye treatment further studied using catalysts effects such as H_2O_2, ZnO, and TiO_2. The marginal higher degradation was obtained for ZnO/UV compared to TiO_2/UV effect, and it may be due to higher bandgap energy of ZnO. The maximum degradation was obtained for H_2O_2/UV (2 g/L) effect. The optimum findings of the present work were initial dye concentration: 31.3 µM, pH: 11, operating temperature: 28 °C, moles of dye removed: 30.1 ± 1.6 µM, moles of total organic carbon removed: 350.4 ± 17.5 µM, rate constant (pseudo-first order): $18.3 \pm 0.7 \times 10^{-3}$ min^{-1}, and energy: $9.4 \pm 0.4 \times 10^{-3}$ µM. The present work showed the higher potential of scale-up photocatalytic reactor for treatment dye pollutants.

Keywords Photocatalytic reactor · Dye degradation · Hydroxyl radicals · Methylene blue · Scale operation · TOC

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Introduction

The technologies for sustainable development are gaining importance with the decline of natural resources. Hence, there is need of hour to search for alternative and intensified technologies for chemical processing and wastewater management [1]. Dye industries are generating large quantities of wastewater and cannot be treated with conventional methods. It required maximum water for processing and considered second highest water consuming after agriculture sector [2, 3]. Chemical oxygen demand (COD) of wastewater released from dye industry is between 5000 and 6000 mg/L. Most practiced activated sludge method (< 200 mg/L) cannot treat such high COD loading wastewater. Advanced techniques need to be developed for dye pollutant treatment [4].

Advanced oxidation techniques are promising tool for efficient sequestration of chemically stable and less biodegradation organic pollutants [5]. These are environmentally clean-up technologies for increasing the efficiency and cost-effectiveness [6]. Oxidation methods are considered as alternative degradation method for the treatment of dye. Commonly practice oxidation processes are photocatalysis, sonochemical, microwave, wet air oxidation, etc., and have distinguished advantages and limitations [5–7]. These energy sources are highly useful for creating highly reactive hydroxyl radical species. These radicals are reacting with dye compounds and mineralize the products into CO_2, H_2O, and other organic salts of dye [7–9].

Photocatalytic technique is considered as one of the promising options for treatment of dye pollutants. It requires a lesser amount of energy and work under ambient processing conditions. The generation of hydroxyl radical in the photocatalytic process involves the series of steps

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Heavy Metal Removal by using Different Agricultural Waste Adsorbants

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Abstract

The heavy metals are most harmful elements of water and having harmful chemical propertiesdue to their toxicitiesto human. Now days the agricultural waste has been used as an option over costlier methods to remove heavy elements such as metals from water. Heavy metals which are highly toxic to mankind, flora, fauna and to the environment which causes effects like pigmentation, keratosis, cardio vascular disease, diabetes, lung and bladder cancers. Agriculture wastes can be utilised as adsorbents including rice husk, sugarcane basse, wheat bran, sawdust etc. and some of the modified absorbents show good adsorption. The present paper review about various methods, techniques and research efforts had taken for removal of heavy metals from water..

Keywords: *Adsorption, Agricultural Waste Adsorbents, Domestic Waste Water, Heavy Metal methods, Toxic Waste Material, Water Purification*

I. INTRODUCTION

Water is the essential needs of all the living beings.Water exists in nature in the form such of potable water sources, ocean, river, and lake. India is going through a serious problem of natural water resources scarcity;the earth has abundance of water but unfortunately only a small amount 0.3% is even usable and attainable. However fresh water sources are becoming scarce with the passage of time. Rain water harvesting will become compulsory in the future as a result we need to treat this water especially that water which in the view of population growth and development. Water pollution due toRapid industrialization specially in developing industry in recent years causes the heavy waste water pollution due to release of heavy metal into water stream and rivers. As a consequence, heavy metals are the byproduct formed due to mining, smelting, refining of ores. Metals have a special concern because of its indestructible and enduring nature. Proper processing facilities as long as all completely contaminated origin is hardas well as lavish. In view huge call for new technical knowledge that is inexpensive, easily available, requires low maintenance and are energy efficient. Everywhere there is field significance of yielding economical adsorbents to change costlier water treatment methods such as chemical precipitation, ion exchange, electro flotation, membrane separation, reverse osmosis, electro dialysis, solvent extraction etc is there. The surface assimilationprocess is effectivelybeneficial and plan of action is simple to isolate during the time that need of management structure is less. Researcher worked on inexpensive materials, rice husk, sugarcane basse, wheat bran, sawdust, which have heavy materials adsorption capacity and are cheaply available agricultural waste.

A little profit of adopting flora/botany refuse used to treat waste water process includes easy approach, demandsimple procedure, goodsurface assimilation, and selective sorption of heavy metallic element, cut rate complimentary accessible along with effortless formation. Yet, the operation of unprocessed agricultural waste sorbents material which has lowsurface assimilation property, high (COD) and (BOD) as well as (TOC).By virtue of

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Automatic Equal Quantity and Quality Water Distribution

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Abstract

Water distribution on the earth surface is not even. Currently there is very less amount of water on the surface is fresh which is nearly 3% and remaining 97 % resides in the ocean. It is evident from the records of national and state governments that the infrastructure for equal water has been provided to India's urban and rural population in most of the states. Water scarcity is the major problem in many rural as well as urban areas in India. Urban water supply system is under tremendous pressure for supplying sufficient quantity of potable water to ever increasing population of India. There is tremendous need of pure water distribution in villages with equal consideration to attain self-sufficiency. Therefore, quality testing sensors are used in our automated equal and quality water distribution unit. This equal and quality water supply automation in water distribution system can be implementing as per customer requirements in different lanes at villages as well as in urban areas. This automation is also possible in case of residential, industrial, commercial buildings, etc. It seems to be a beneficial method for minimizing water scarcity as well as health issues. In this paper we discussed to design equal and quality water distribution systems by using electronics and IoT (Internet of Things) to ease water management and provide proper water distribution and water quality.

Keywords: *Arduino Uno Connections, Automatic water distribution, Communication technology, Internet of things, Solenoid switch*

I. INTRODUCTION

To provide adequate water in proper quality as well as quantity in appropriate time is one of the most significant problem in past. As populations increases, the user demands also increased. The National Rural Drinking Water Programme (NRDWP) was established in 2009 provides water for drinking, cooking and other domestic needs to every people. Also, municipal corporations in urban areas have already started the implementation in water distribution with some of the automations which are not economical if considered with villages or rural areas. The several constraints like water scarcity, uneven water distribution, leakage problems are the current conditions in cities and villages. Also, different floors in residential apartments and public buildings, different shops or units in industry, different lanes in villages are facing the problems of equal or uniform water distribution system which are causing large disputes, especially in summer season or rainy season. The purpose of system is to provide water to consumer with appropriate quality, quantity, pressure and time. There are different types of modifications are available throughout the world. One of them by using the chaos-logic based water demand prediction method which predict as well as control the water level of the reservoir in Japan and China. In India, one of the gram panchayat, Malkapur, Karad, Maharashtra has developed system for Water Supplyof 24x7 by adopting Koyana River as perpetual sourceand it is designed for next 10 to 15 years. The system was designed using "Water Gems" software. This action is 100% fruitful with healthy residents as not a single doctor is required in this gram panchayat. In another research the prototype with Internet of Things (IoT) is designed

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Article

Semi-Active Fluid Viscous Dampers for Seismic Mitigation of RC Elevated Liquid Storage Tanks

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Citations (19) References (44)

Abstract

The effectiveness of the semi-active control strategies using fluid viscous dampers (SAFVDs) for seismic mitigation of reinforced concrete (RC) elevated liquid storage tanks is investigated. Three control algorithms are employed for regulating the damping coefficient of the SAFVDs: (1) Passive-OFF, (2) Passive-ON, and (3) Clipped Optimal Control (COC). The uncontrolled response of the tank is compared with those installed with SAFVD of different control algorithms. Focus is also placed on various positions of the dampers, viz., dampers installed at alternate levels (Configurations I, II, IV, and V) and at all levels (Configurations III and VI) of the staging. A discrete two-mass model for the liquid and multi-degree-of-freedom system for the staging, installed with the dampers, is developed for the RC elevated liquid storage tanks. The response of the broad and slender tanks is studied, for which the ratios of the height of the liquid to the radius of the container are 0.5 and 2.0, respectively. The time-history response of the elevated tank is evaluated for eight different earthquake ground motions, including near- and far-field earthquakes. A MATLAB code was developed to solve the coupled differential equations of motion of the system using the state-space approach. Key parameters, viz., convective displacement, rigid mass displacement, base shear, overturning moment, and damper force, are evaluated. The results show that all the control systems considered herein are beneficial in reducing the seismic responses. The frequency response function for the uncontrolled and semi-actively controlled liquid storage tank in frequency domain exhibits significant response reduction, highlighting the effectiveness of the SAFVDs. The structural response is effectively controlled using the SAFVDs with Passive-OFF (valve closed) and COC algorithms. The COC algorithm employed in this study is a promising candidate for the seismic mitigation of RC elevated liquid storage tanks using the semi-active control.

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ORIGINAL RESEARCH Open Access

Numerical analysis of reinforced embankment slopes made up of pozzolanic waste materials

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Abstract

The paper presents the numerical study of the bearing capacity behavior of the model footing placed on the top of reinforced embankment slopes made up of Pozzolanic waste materials such as fly ash and ground granulated blast furnace slag (GGBFS). The present investigation is aimed at studying the efficacy of the different types of reinforcement (geogrid and rubbergrid) in improving the load bearing capacity of the embankment slopes made up of waste materials. The effect of various parameters such as slope angle, location of the footing with slope crest, embedment depth of the reinforcement is studied on the strength behavior of the embankment. The analysis is carried out on unreinforced fly ash and GGBFS embankments for three slope angles and three locations of the footing with respect to slope crest, i.e., edge distance. The fly ash slopes reinforced with geogrid and rubber grid reinforcement is also analyzed for all the three slope angles and edge distances as that in unreinforced fly ash embankment slope and further, for various embedment depths of the layer of reinforcement. The GGBFS embankment reinforced with geogrid layer is analyzed with respect to critical slope angle and edge distance and optimum embedment depth of the reinforcement deduced from the unreinforced fly ash and GGBFS embankment and reinforced fly ash embankment. The analysis demonstrated that the load carrying capacity of the embankment slope decreases with increase in slope angle and edge distance in respect of unreinforced and reinforced fly ash slope and the optimum embedment depth ratio seems to be 1.2. Further, the rubbergrid reinforcement is found to perform better than the geogrid. The performance of geogrid reinforced GGBFS embankment is also noteworthy. The study underscores the effective utilization of Pozzolanic waste materials as the embankment slope and the rubbergrid derived out of discarded tyres.

Keywords: Numerical analysis, Bearing capacity, Embankment slope, Strip footing, Fly ash, GGBFS, Geogrid, Rubbergrid

Introduction

The disposal of fly ash industrial wastes coming out of the thermal power plants is a major concern and requires a large land area. The structural fills or embankments are one of the promising areas of utilization of fly ash. Nowadays, even the use of other industrial waste materials such as ground granulated blast furnace slag,\copper slag, etc. containing Pozzolanic properties, has also gained a wide popularity in the embankment

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An Experimental Study on Strength and Properties of Thirsty Concrete

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Abstract- **In this paper , a thirsty concrete used for roadway is introduced .It is an concrete with high porosity used for flatwork applications that allows to pass through which reduces the runoff from a site and help recharging ground water levels. Using the common material and method, the strength of the pervious concrete is low. Hence the materials with different type, shapes and sizes are used to get better results. The infiltration rate, abrasion resistance and durability of the materials used are also good. And an experimental study evaluating strength and permeability characteristics of a pervious concrete mix design is presented. The experimental work included compressive strength tests(at 7 and 28 days, and infiltration rate test(at 28 days) on clean specimens .Resulting that Its void content ranges from 18 to 35% with compressive strengths of 2.74 to 27.56 MPa .Pervious concrete is used in parking areas, roadways, pedestrian walkways, and greenhouses and contributes to sustainable construction. In this project scrap marble is used to make pervious concrete and also checking various parameters like permeability and compressive strength with respect to different shapes of aggregate like angular, rounded, and flaky type. Under the guidance of J. Kumar RMC plant PUNE, this project was successfully completed.**

I. INTRODUCTION

Improvement in construction industry and infrastructure in India, maximum metro cities tends to getting covered with impermeable concrete pavements which results into environmental problems such as fall of recharge of rainwater into the ground hence continuous reduction in water table which leads to water crisis during summer. environmental issues such as erosion, decrease in ground water table, pollution of rivers, lakes, and coastal waters are occurred due to the falling of maximum quantity of rainwater on impermeable surfaces hence the best solution to get rid of all these problems stated above is the installation of pavement surfaces made up of thirsty concrete which is an environmentally friendly material. Although emphasis has been placed on the conventional pervious concrete and it's porosity, not much research has been carried out to characterize the relationship between compressive behavior of pervious concrete with varied aggregate type and almost no research has been done using scrap marble as aggregate. In this research cubes using different types of aggregate where casted for M40 grade of concrete in which aggregate size vary from 4.75mm to 12.5 mm.

II. OBJECTIVES

Objectives of proposed work would be:

1. To enhance compressive strength of pervious concrete by using different shaped coarse aggregates and replacing aggregate with marble.
2. To study water penetration property of pervious concrete by varying shape of coarse aggregates and replacing aggregate with marble.
3. To study abrasion resistance property of pervious concrete pavement.
4. To check which type/shape of aggregate used for making pervious concrete gives maximum rate of infiltration.

III. EXPERIMENTAL WORK

i) Tests on material:

Following are the tests that have taken on materials used to get their physical properties:

	Angular	Rounded	Flaky	Scrap marble
Specifc gravity	2.84	2.62	2.7	2.78
Water absorption	0.78	0.62	0.81	0.5
Aggregate impact	13.68	16.86	20.9	22.68
Aggregate crushing	17.50	_	25.29	30.10
Flakiness index	11	6	40	_
Elongation index	31.58	_	8.6	_
LAabrasion value	17	11	22	10.46

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A REVIEW PAPER ON AN EXPERIMENTAL STUDY ON STRENGTH AND PROPERTIES OF THIRSTY CONCRETE

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Abstract— **Pervious concrete is a special high porosity concrete used for flatwork applications that allows water from precipitation and other sources to pass through, thereby reducing the runoff from a site and recharging ground water levels. Its void content ranges from 18 to 35% with compressive strengths of 2.74 to 27.56 MPa . Typically, pervious concrete has little or no fine aggregate and has just enough cementitious paste to coat the coarse aggregate particles while preserving the interconnectivity of the voids. Pervious concrete is traditionally used in parking areas, areas with light traffic, pedestrian walkways, and greenhouses and contributes to sustainable construction.In this project we are using scrap marble to make pervious concrete and also checking various parameters like permeability and compressive strength with respect to different types of aggregate like angular, rounded, and flaky type. Cubes made from all types of aggregate where casted and compressive strength test (at 7 and 28 days) along with infiltration test (at 28 days) where carried out. This project was successfully completed under the guidance of J. Kumar RMC plant PUNE.**

I.INTRODUCTION

Our cities are being covered with building and the airproof concrete road more and more. In addition, the environment of city is far from natural. Because of the lack of water permeability and air permeability of the common concrete pavement, the rainwater is not filtered underground. Without constant supply of water to the soil, plants are difficult to grow normally. In addition, it is difficult for soil to exchange heat and moisture with air; therefore, the temperature and humidity of the Earth's surface in large cities cannot be adjusted. This brings the phenomenon of hot island in city. At the same time, the plash on the road during a rainy day reduces the safety of traffic of vehicle and foot passenger. The pervious concrete pavement possesses many advantages that improves city environment.

The last century in the construction industry has shown an increasing interest in pervious concrete, an environmentally friendly material. Although emphasis has been placed on the relationship between compressive behaviour of conventional pervious concrete and total porosity, not much research has been carried out to characterize the relationship between compressive behaviour of pervious concrete with varied aggregate type and almost no research has been done using scrap marble as aggregate. In this research cubes using different types of aggregate where casted for M40 grade of concrete in which aggregate size vary from 4.75mm to 12.5 mm.

II.LITERATURE REVIEW

Jing Yang(2003) showed in their paper that, a pervious concrete pavement material used for roadway is introduced As aggregate size decreases compressive strength increases while water absorption decreases. Silica Fume and Super plasticizer can be used to produce high strength and good water penetrable pervious concrete. Samples are tested for Compressive strength, Flexural strength, Split tensile strength, Abrasion resistance and freezing and thawing durability.Void percentage determines compressive strength and permeability of pervious concrete. Cement quality must be adjusted according to smaller size aggregate to enhance strength. By using SF,SP and organic polymer can enhance strength of pervious concrete. But it is difficult to ensure relation between them and water absorption.

Ming-Gin Lee found that ability of Pervious concrete material to eliminate pollutants and purify water is effective in dilute sulphuric acid, artificial seawater and motor oil tests. After flowing through pervious concrete pavement, a diluted sulfuric acid

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Risk Management In Infrastructure Development

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Abstract: **The Construction industry is very risk inclined, with mind-boggling and dynamic venture conditions which make an environment of high vulnerability and risk. The business is powerless against different specialized, socio-political and business dangers. The reputation to adapt to these dangers have not been generally excellent in the development industry. Subsequently, the general population working in the business bear different disappointments, for example, disappointment of submitting to quality and operational prerequisites, cost overwhelms and unsure deferrals in undertaking consummation. Risk management is a procedure which consists of distinguishing proof of dangers, evaluation with subjectively and quantitatively, reactions with an appropriate technique for dealing with dangers, and afterward controls the dangers by checking. This paper covers the ideas of risk the executives and different risk investigation strategies to be utilized for the on- stop answer for a wide range of perils well on the way to happen amid any development venture life cycle.**

Index Terms- **Development industry, Risk Management, Risk Investigation**

I. INTRODUCTION:

The improvement of the foundation is a standout amongst the most imperative exercises that can support up to the matter of different enterprises, in this way expanding the total national output (GDP) of the nation. Development ventures are constantly one of a kind and dangers raises from various diverse sources. Risk is characterized as any activity or event which will influence the accomplishment of venture goals. Risk management is a method which is utilized in numerous ventures from, IT identified with business, car, pharmaceutical industry, to the development division. Dangers and vulnerabilities natural in the development ventures are more than some other enterprises. Numerous enterprises have turned out to be progressively proactive about utilizing risk the executive's procedures in the task. In any case, as for the development business, the equivalent isn't utilized usually. Risk is a vital segment of any task. Risk is available in all ventures regardless of their size or area. No task is thoroughly free from dangers. On the off chance that dangers are not legitimately examined and techniques are not prepared to manage them, the venture is probably going to prompt disappointments.

1.1Concept of Risk Analysis and Management:

Risk management is a procedure which distinguishes the venture dangers, investigate them, and decide the activities to turn away the dangers on any undertaking. All means in the risk management procedure ought to be incorporated to manage dangers, to execute the procedure of the task. Because of the idea of development ventures, chance administration is a critical procedure. Risk related to the development industry can be extensively ordered into:

1. Specialized Risks: The dangers related to the Incomplete Design, Inadequate particular, lacking site examination, change in extension, Construction strategies and deficient asset accessibility and so on are named as specialized dangers.

2. Development Risks: These dangers incorporate Labor profitability, Labor debate, Site condition, Equipment disappointments, Design changes, too top-notch standard and new innovation.

3. Physical Risks: The dangers emerging from the Damage to structure, Damage to hardware, Labor wounds, Equipment and material flame and robbery and so on are known as physical dangers.

4. Authoritative Risks: The hierarchical dangers comprise of Contractual relations, Contractor's involvement, Attitudes of members, unpracticed work power and Communication.

5. Money related Risks: Increased material cost, Low market request, Exchange rate change, Payment delays and inappropriate estimation charges and so forth are identified with budgetary dangers.

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Productivity Analysis of Building Construction Using Mivan Formwork

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Abstract- **Nowadays, most of the clients expect the completion of the project in the shortest time possible to minimize the costs. For the high-rise buildings, the most effective way to speed up work is to achieve a very short floor cycle. Productivity has for many years been an issue for the construction site. Productivity enables the companies to monitor their own performance against site performance. Formwork systems are among the factors determining the success of a construction of a project in terms of speed quality, labour cost and safety. There are also signs of slowed productivity in India relative to other developed countries. The productivity of construction labour in other countries e.g. Japan increased by 6.6% a year, while Indian construction productivity rose by only 1.6%. In metro cities, few companies have started using faster construction techniques. Concrete formwork labour costs constitute over 1/3 of total concrete construction costs. Hence, in this paper Productivity of Mivan technology as compared to conventional technology will be analysed with respect to Labour efficiency, Cost and Time. One case study related to Mivan technology is discussed in this paper. This Project was successfully completed under the guidance of civil engineers at Kolte-Patil Developers Ltd.**

Index Terms- Productivity, Mivan Formwork, Conventional Formwork, man-days

1. INTRODUCTION

With advancement in cost industry it has become necessary to keep account of expenditure made in the process. Productivity is one of the most important factors affecting the overall performance of any construction site, large or small. The view of productivity has become a major concern to deal with. In general terms, construction productivity can be simply illustrated by an association between an output and an input. High productivity refers to doing the work in a shortest possible time with least expenditure on inputs without sacrificing quality and with minimum wastage of resources. Productivity measurement at construction site level enables companies to monitor their own performance against their site performance. Construction productivity at construction site level can be grouped under various departments likes productivity in Labour efficiency, Cost, concrete, steel work and shuttering.

However, Mivan Technology is one of the techniques that are used for quick construction. It includes the wall-panel units and slab units directly added to building structure. The use of aluminium is also evolved as one of the techniques for quick construction.

The human resource is extremely important in construction industry because construction projects are unique and complex. These characteristics inhibit full automation compared to other industries. The individual skill of each craftsman, the abilities to communicate, make decisions, work with others, and share information, makes this resource unique and irreplaceable in future.

Objectives of this study are to determine:

The productivity by comparing the labourers of Mivan and conventional formwork, thereby tracing variation of actual productivity from target productivity.

Determine productivity and efficiency of the project by comparison between material costs of Mivan formwork and conventional formwork and further provide a basis for understanding the present status and future direction of productivity measurement.

2. LITERATURE REVIEW

James D. Shumway (2001) concluded that Productivity is the labour work hours required to construct 100 square feet of contact area. He also

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Measuring Project Performance and Success Factors of Construction Sites

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Abstract- **Project performance is crucial issue for the construction industry. The need for performance measurement systems is critical in the construction. In projects, timely completion and client satisfaction are often used to determine success. The effective performance of the construction project manager to perform his job functions with intended efficacy is important for the success of the construction project. Because the industry has intricacy in its nature because it contains large number of parties such as contractors, clients, consultants, government agencies, stakeholders etc. Construction projects suffer from many problems and complex issues in performance some of which includes cost, time and quality. Therefore for measurement of performance and then optimizing it, measurement of set of desired targets is necessary for the control of variability of the main and sub- process within the processes involed in a project. This paper reviews the methods for performance measurement, identification of KPIs and then methods for finding KPIs specific to a region or a project.**

Index Terms- Performance measurement, project success, project manager, control, KPIs.

I. INTRODUCTION

The construction industry in India contributes to around 11% of the gross domestic product. Size of the India's construction industry expected to be USD 1 trillion by 2025 (makeinindia.com/sector/construction, web page). Therefore, improvements in construction industry performance have a major economic impact. Systematic performance improvement demands also systematic means to measure performance and its development according to J. Salminen, 2005.

Due to highly unstructured Indian construction market, there is little to none efforts made in analysing the performance of a project which leads to underperformance in the form of poor utilization of time and finance and resources. There is a lack of appropriate project management system to improve construction performance.

Performance measurement means collecting and analysing the data regarding the volume of input and the subsequent volume of output, basically the efficiency and productivity of a project (OECD, 2001, p.11). Performance measurement in the construction industry is difficult due to spectrum of variables and factors being exceedingly large and complex. It is difficult to define output and differentiate it from the input and therefore to measure it (Djellal and Gallouj, 2013). Therefore there is a need to find out Key Performance Indicators (KPIs) which affects the construction projects the most. These can be project specific or generalized factors depending on the scope of the work. Indicators help in the measurement by specifying the critical areas. Therefore defining the KPIs play an important role in project delivery.

II.PERFORMANCE MEASUREMENT

A main objective in management is to improve the competitive ability of a company. Performance is something that is very closely connected to a company's competitiveness as said by Juha Salminen (2005)[1]

Brown (1995) ties performance measurement strongly to the organization process, which consists of inputs, process, and outputs and also the long-term results and final goals of the company. Financial results and process efficiency still play a central role, but factors related to business environment and employees are equally important. The six elements of performance, according to Brown, are:

- financial performance,
- product/service quality,
- supplier performance,
- customer satisfaction,

BEHAVIOUR OF SANDWICH PLATE SYSTEM IN BRIDGE DECKS

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Abstract : The demand for lighter steel bridges is always sought after. Manufacturers are always searching for new solutions to decrease the weight of bridges and to improve the service life without compromising bearing capacity. Possible modifications are replacing the conventional orthotropic steel deck with a steel sandwich deck for improved weight and performance. The sandwich plate system, comprising two (steel) flange plates bonded to a continuous elastomer core or web, forms a much stiffer and stronger system than a single steel plate and it does not need closely spaced stiffeners and is relatively fatigue insensitive. In this paper, eight types of steel polyurethane sandwich plates are analyzed and tested under universal testing machine.

IndexTerms **- polyurethane, elastomer, SPS, Sandwich Plate system, bridge deck**

I. INTRODUCTION

A bridge deck is the roadway, or the pedestrian walkway, surface of a bridge, and is one of the structural element of the superstructure of a bridge. The deck may be constructed of wood, concrete and steel. The deck may be covered with asphalt or and concrete. The concrete deck is the integral part of the bridge structure in the form of T-beam or double tee structure or it may be supported with I-beams or steel girders. There are different types of bridge decks such as bridge decks with stiffened plates, orthotropic bridge deck, closely spaced ribs deck, bridge deck with steel girders etc.

A sandwich plate system comprised of two steel plates bonded to a solid elastomer core, has been proposed for bridge decks. The use of an elastomer core has a number of advantages. The elastomer core prevents the steel plate from buckling. Also, the steel plates are entirely reinforced so that intermediate stiffeners are not required. Another advantage of a sandwich plate system is that the size of each steel plate and the core can be adjusted to any desired thickness based on the structural load requirements. A sandwich plate bridge deck has advantages over a reinforced concrete deck. The concrete bridge deck is heavier than the sandwich plate deck. A considerable amount of cost can be reduced by using a sandwich plate bridge deck panel. The savings come from the increased stiffness of the composite deck, ease of construction, and savings in repair costs over the life time of the structure.

A bridge deck using sandwich plate panels has been proposed as a replacement to traditional reinforced concrete bridge decks. A perimeter box consists of steel is constructed and the elastomer is injected using standard pumping equipment. The transverse ends of the box are cross stringers. To construct the bridge, the cross stringers are bolted to steel girders and the panels are bolted to each other. After the bolts are pretension, a groove weld is placed in the field to develop full composite action.

II. Literature survey:

Kennedy et al. (2002), has discussed the need for a lightweight, cost efficient bridge deck for movable and military bridge decks. Traditional steel plate orthotropic bridge decks are costly because of the type and amount of welding required. A traditional steel box girder is compared to a stiffened sandwich plate box girder and a sandwich plate used box girder. In their study, only the effects of traffic loads were examined on the different deck configurations. Stiffened sandwich plates and sandwich plate system without stiffeners both gave good results than steel box girder. They concluded that the system as described above is an attractive alternative to traditional bridge decks due to reduced welding and ease of erection [1].

K V Ramakrishnan, Dr P G Sunil Kumar (2016), Considering the high strength to weight ratio, ease of construction, blast and ballistic properties of the material, availability of a flush surface etc., SPS has been widely used in building bridges, stadiums, floors, blast walls etc. Sandwich plate panels have also been used in ship repair as an overlay on existing structures, converting them conventional steel to sandwich plates. The use of complete hull structure made of SPS is not easy. Upto the date, there is no detailed study about ship hull sandwich panel is available just beacause of the non-availability of proper design tools for the sandwich panel system [2].

Chenglin Shan (2017), The buckling of steel-polyurethane sandwich bridge deck is studied nonlinear numerical calculations, the authors first analyzed the stress distribution of key points of a three-span continuous bridge deck with sandwich structure in the state of buckling and then analyzed the influence of the changes of several size parameters on the buckling modes and the critical loads. The results show that when the sandwich bridge deck is compressed, the closer to the middle section in mid-span, the greater the longitudinal compressive stress on the steel faceplate, but the smaller the longitudinal compressive stress on the bottom of the stiffening ribs. The longitudinal stresses on the steel faceplate and the bottom of the longitudinal stiffeners are unevenly transversely distributed near the ends of the applied force, but the stresses are gradually uniform near the mid span section. According to author, thickness of the sandwich panel must be selected first prior to the spacing of the longitudinal stiffening ribs in order to save the material and reduce the work load [3].

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Study on Combination of Mycelium and Fly Ash Brick

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Abstract- **This study introduced us the development of combination of mycelium and fly ash brick with certain characteristics. As the mycelium brick grows, heals and repairs itself whereas fly ash is the recyclable and organic by product of burnt coal. This brick includes the use of natural resources and it maintains the harmony of environment. The aim is to produce natural construction material which will match the existing alternatives. The testing data showed that this combination gives good performance result. Moreover, the use of such unique construction material in construction field will help us to have a sustainable and eco-friendly infrastructural development.**

Index Terms- Brick trends, Eco-friendly construction material, Mycelium brick, Sustainable construction material

I. INTRODUCTION

In current scenario there is a lot of need of construction material which is cheap and eco-friendly. Universally, it is hard to assess what number of individuals ceases to exist rashly because of various toxins. According to WHO for air contamination roughly 3 million passed on every year. Among them 8lack individuals die because of lung, cardiovascular and respiratory issues etc. One of the major source of air pollution is brick kilns. Breathing in such pollutants causes skin and eye irritation and pneumonic ailments such as pneumoniosis and silicosis. Contamination additionally affects rural yield and organic products. In order to overcome all these issues a great replacement against standard modular bricks can be done by combination of fly ash and mycelium brick.

1.1 Concept of mycelium and fly ash bricks

When mycelium is left to dry it can become an excellent raw material for construction, as it forms a root like structure called *hyphae* which binds the mixture. A mycelium brick is an organic brick that is grown from organic waste and fungus of mycelium.

The use of fly ash improves the workability of concrete and reduces the use of portland cement. It strengthens and hardens the brick. Fly ash is obtained from coal dust which is been considered as waste product from homes and industry. The combination of these two bricks and properties of their component provides an efficient alternative to traditional construction material at cheaper cost.

Constituents of the brick are as follows:

1. Organic waste:

Wheat straws, saw dust, mushroom seeds (Oyster Spawn), agricultural waste are used.

2. Binding and growing agents:

Sugar, flours etc helps to initiate the growth and bind the mixture.

3. Fly ash:

It is a grey colored by product of coal which is completely natural and doesn't harm environment. It also helps in providing good strength of brick.

4. Cement:

Ordinary Portland cement which is a combination of lime sludge, cement, aluminium powder and gypsum is used in this brick.

5. Sand:

The locally available sand or stone dust or river sand can be used for making of the brick. The deleterious materials such as silt, clay lumps and coal particles should not be more than 5%.

1.2 Contribution of constituents:

The proportion of mycelium and fly ash brick components is taken as 40% and 60% .Hence 30% is the contribution of organic waste, 10% is the contribution of growing and binding agent. Fly ash contributes about 36% of the total brick mass,

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"Drag Coefficient of Tall Building by CFD Method using ANSYS"

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Abstract - *Wind is a more effective lateral load than Earthquake for a tall building owing to larger time period. It is suggested in literature, to analyze a building over 200 meters for wind loads. Generally, wind tunnels are used for analyzing only some important tall buildings because of higher modeling cost and unavailability of suitable wind tunnel. Computational Fluid Dynamic provides a worthy alternative to simulate the prevailing conditions and give fairly accurate results. Thus, a comparison is carried out using ANSYS 16.0 Fluent for checking the CFD analysis. Checking the effect of shape of building on wind analysis, drag* coefficients are found out using CFD analysis for different shapes of building in plan and compared with the values given in IS 875-Part III 2015(table-25).

***Key Words*: CFD Analysis, Drag Coefficient, Ansys16.**

1. INTRODUCTION:

Wind Engineering is studied universally by wind tunnel, full scale test, analytically and by using Computational Fluid Dynamics (CFD). In wind tunnel studies, scaled models of structures are subjected to scaled atmospheric wind in a controlled laboratory set-up. Then sensors installed on the model can measure the physical quantities of interest such as shear, moment, pressure etc. Most of the complex architectural and structural innovations are being confirmed through wind tunnel tests. With full-scale studies, actual buildings already built will be used to get instrumented and put into test in natural wind flow for several months in order to get decent measurements. Full-scale studies are good to improve our understanding of the science as well as the simulation in wind tunnel. But these types of studies are not practical in day-to-day life. With analytical studies, the structures are modeled in structural dynamic sense and the wind flow is modeled as stochastic time series and thereafter, the response of the structure is obtained by random vibration techniques. In Computational Fluid Dynamics (CFD) studies, like in analytical studies, the structures are modeled in structural dynamic sense. But the wind flow is modeled using basic fluid dynamic equations such as continuity, energy and momentum equations.

1.1 Drag Coefficients:

Air resistance, also known as drag, is a force that is caused by air, the force acts in the opposite direction to an object moving through the air. It is where air particles hit the front of the object slowing it down. The more surface area, the more air particles hit it and the greater the resistance.

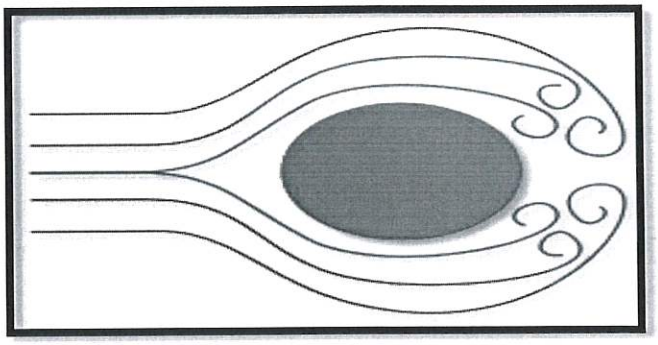


Fig - 1: Drag Coefficient

Given below is the drag equation;

$$F_d = C_d \, 1/2 \, \rho \, v^2 \, A$$

Where,

F_d = drag force (N).

C_d = drag coefficient.

ρ = density of fluid (1.2 kg/m^3 for air at NTP).

v = flow velocity.

A = characteristic frontal area of the body.

It is observed from the above equation that,

- Drag Coefficient is directly proportional to the drag force on the structures.
- Drag coefficient is inversely proportional to the density of fluid i.e higher drag coefficient is in water than in air.
- Drag Coefficient is inversely proportional to the velocity of fluid.

According to IS 875 Part III, a non-dimensional coefficient such that the total wind force on a body is -

the product of the force coefficient, the dynamic -pressure of the incident design wind speed and the reference area over which the force is required. When the force is in the direction of the incident wind, the non-dimensional coefficient will be called as 'drag coefficient'. Referring of IS code 875 Part III, the value of force coefficients apply to a building or structure

Article

Steel fibre reinforced concrete beams without reinforcement under combined bending, shear and torsion

April 2012 · Indian Concrete Journal 86(4):39-45

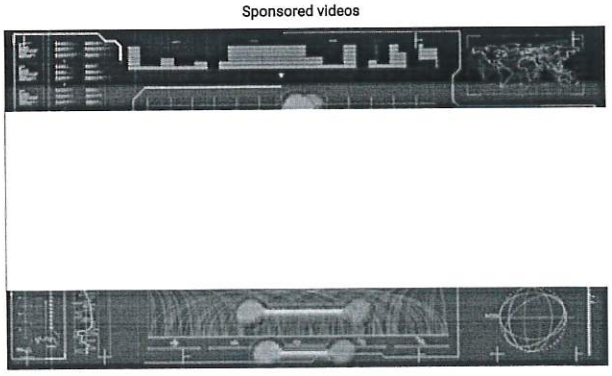
Authors:

A.S. Pant **S.R. Parekar**

Citations (9) References (14)

Abstract

This paper presents the results of an investigation carried out to assess the torsional behavior of steel fibre reinforced concrete (SFRC) rectangular beams, without longitudinal and transverse reinforcement. The beams were subjected to a combination of bending, shear and torsion stresses. The individual influence of torsion to moment ratio (T/M) and torsion to shear ratio (T/V) on the behavior of beams, modes of failure and ultimate torsional strength were studied. The study involved testing twenty rectangular beams; half of them under combined bending-shear-torsion and the remaining half ten under shear-torsion. The experimentally obtained torsional strengths compared well with those predicted by the theoretical models proposed by Mansur and Mansur-Paramasivam. In addition, the two modes of failure namely mode 1 and mode 2 identified by "Mansur" and "Mansur-Paramasivam" were validated in this study.



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Design of EPS Geofoam as a Pavement Block

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Abstract- Expanded polystyrene Geofoam (EPS) has offered solutions to many civil engineering problems associated with pavement construction. Issues, such as the construction of pavements on low bearing capacity subgrade soils (such as peats and clays), or in regions with severe winters, and the construction of pavements over underground services, these all have been overcome with the use of EPS geofoam. From this paper it is concluded that this material is used for many pavement applications and these include the use of EPS geofoam as a lightweight fill, as a thermal insulator, a vibration dampener, and for the protection of underground services. But, there are a number of barriers that are stopping the use of EPS geofoam from becoming standard worldwide. Thus is requires a development and proliferate technical knowledge to avoid the inefficient, and even the incorrect use of EPS geofoam and there is also room for research in the development of latest and innovative applications for the use of EPS geofoam, and for the development of updated standards and test procedures. To facilitate research in these areas, this review paper discusses the design considerations.

Keywords: - Expanded polystyrene, densities of geofoam, design consideration.

I. INTRODUCTION

Expanded polystyrene (EPS) is a polymeric geosynthetic material with a cellular closed cell structure. Its manufacture involves the heating of expandable beads of polystyrene with steam, and the placement of these heated expanded polystyrene beads into moulds to create prismatic blocks of EPS[1]. These blocks are manufactured for use in a variety of civil engineering applications. One of its primary applications is in pavement construction to counter the issue of low bearing capacity subgrade soils, an application that has been very successful, and, consequently, has been widely adopted and utilized for more than four decades[2]. Other applications of EPS include thermal insulation, compressible inclusion, slope stability, bridge abutment construction, stadium seating construction, and even noise/vibration dampening[3-5] .There are a number of attributes that make expanded polystyrene a suitable material for pavement construction. Firstly, EPS is an ultra-lightweight material that has a density of approximately 1/100th of other conventional fill materials (see Table 1). This means that EPS can be used in a lightweight fill application, where it is used in the place of low bearing capacity foundation soils or heavy fill materials, to prevent the associated issue of unacceptable rates of settlement. Also, EPS has a small Poisson's ratio, and a high self-sustaining character, resulting in reduced lateral pressure when used as a backfill material for structures like retaining walls. Other benefits include the savings that can be made in cost and time during construction. The cost savings can also be made from the decreased in maintenance costs due to the low settlement associated with EPS geofoam block, since the volume of soft soil that needs to be removed can be reduced (some scenarios), and since the costly task of utility relocation can be avoided entirely (construction can be done over utilities). In addition, savings in construction times can be made since construction can continue during adverse weather conditions, since the time needed for underlying soils to consolidate is eliminated, and since the installation is rapid [6-8]

Table 1

Ranges in densities of typical lightweight fills

Lightweight Fill Type	Range in Density
Geofoam(EPS)	12-35
Foamed Concrete	335-770
Wood Fibre	550-960
Shredded Tyres	600-900
Expanded shale and Clay	600-1040
Fly-ash	1120-1440
Boiler Slag	1000-1750
Air cooled slag	1100-1500

II. LITERATURE REVIEW

A. H. Padade and J. N. Mandal (2014) showed in their paper that, the interface strength behavior of EPS geofoam was not significantly influenced by its density, also the failure envelopes for all the interfaces were found to be almost linear and the behavior of EPS geofoam to geofoam interface exhibits peak and residual trends in shear strength. However, no peak and residual shear strengths were observed in all other interface behaviors. For all densities of EPS geofoam, it was observed that no significant variation was found in

International Journal of Recent Technology and Engineering (IJRTE)
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Optimizing Municipal Solid Waste Transportation Routes for Pune City using MATLAB

Sanjay D. Nagrale, Sunil B. Thakare

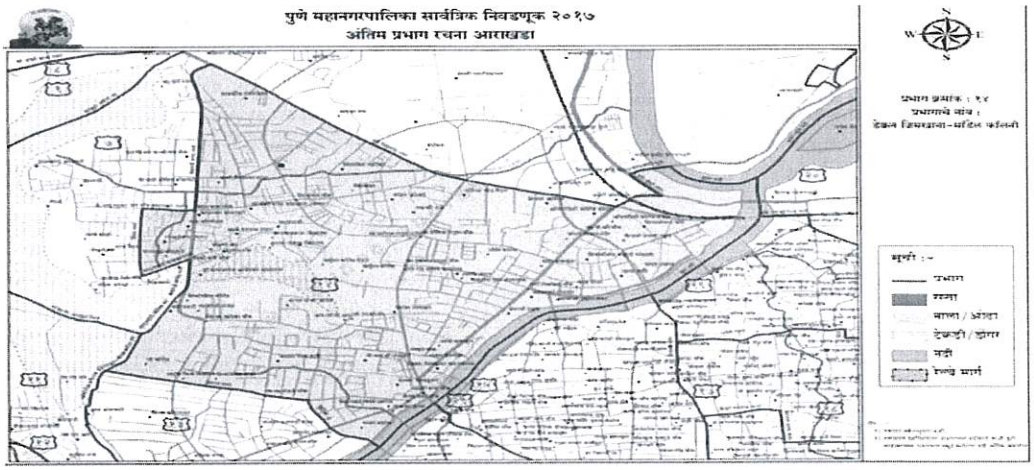
Abstract: *The environment is heading towards a potential risk due to unsustainable waste disposal. It is a sensitive issue which concerns about serious environmental problems in today's world. The present situation of direct dumping of the waste without proper inspection and separation leaves a serious impact of environmental pollution causing a tremendous growth in health related problems. "Domestic, industrial and other wastes, whether they are of low or medium level wastes, they are causing environmental pollution and have become perennial problems for mankind. If this situation is not handled in a proper manner within time then it would lead to worse consequences on a global level. There has been development of new technologies for improving the waste management systems. In this paper we attempt to show a detailed analysis of three crucial parameters: distance, time and cost affecting the solid waste management system by a direct comparison of existing routes and through the routes obtained by application of Arc GIS. Method adopted for analysis is VAM (Vogel's Approximation Method) a part of Transportation model, and results of the same are validated using MATLAB Software programmed exclusively for VAM.*

Keyword- Municipal solid waste management, VAM, MATLAB, Transportation model

I. INTRODUCTION

The environment is risking through unsustainable waste disposal. It is a sensitive issue that concerns grave environmental problems in the world today. The current situation of direct waste dumping without proper inspection and separation has a serious impact on environmental pollution, which leads to a tremendous increase in health problems. "Domestic, industrial and other waste, whether low or medium-sized, causes environmental pollution and has become perennial problems for mankind." If this situation is not dealt with properly in time, it would have worse global consequences. In many countries, there has been awareness of waste management. New technologies for improving waste management systems have been developed. GIS is one of the new technologies that have contributed significantly to the waste management society in a much shorter period of time. "The Geographic Information System (GIS) helps manipulate computer data to simulate alternatives and make the most efficient decisions."

II. ORIGINAL MAP



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Seismic Retrofitting by Adding a Shear Wall

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Abstract: ***Seismic retrofitting is strengthening of existing structures in order to make them more resistant to seismic activity and ground motion due to earthquake. Considering seismic demand of structures with earthquake near metropolitan and urban areas, the need of seismic retrofitting should be well satisfied. For serving this purpose seismic retrofitting by adding a shear wall is considered for study, in which G+5 storey building is taken for analysis with and without shear wall. Modeling and analysis of G+5 steel model is carried out in SAP2000. For validation purpose , model is tested on shake table. Present study shows that structure becomes stiff by addition of shear wall and reduces displacement.***
Keywords: Seismic retrofitting, shear wall, SAP2000, steady state analysis, time history analysis, shake table.

I. INTRODUCTION

Seismic retrofitting is the technique in which the strengthening of existing structures is done to make it resistant from seismic activity such as ground motion due to earthquake , soil failure etc. Following methods listed below are used to satisfy this purpose. In retrofitting, elements or components such as shear wall, bracing etc are either added or subtracted in order to maintain structural stability and strength. In above context added means addition of shear wall or bracing and subtraction means mass reduction in the form of a storey or a component such as beam column etc.

A. Methods

There are two main techniques of retrofitting:

1) Global Retrofitting Techniques

a) Adding shear wall
b) Adding bracing
c) Mass reduction
d) Wall thickening
e) Base isolation
f) Mass dampers

2) Local Retrofitting Techniques

a) Jacketing of Beam
b) Jacketing of Columns
c) Jacketing of Beam and Column Joints
d) Jacketing of Individual footing

B. Retrofitting By adding shear wall

Retrofitting by adding shear wall is frequently used for non ductile reinforced concrete building frames. In this method the element added may be pre-casted or cast in-situ. Element added is placed at the exterior of building in order to avoid interior molding.

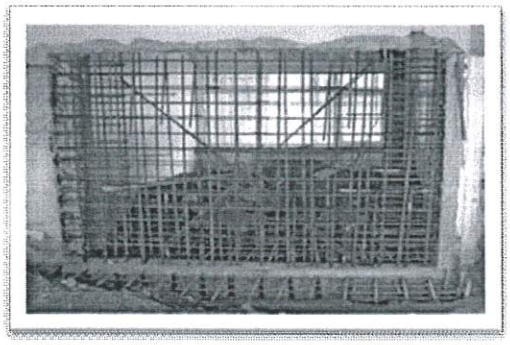

Fig. 1 : Adding of shear wall

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Stress Distribution of Different Shapes of Opening in Shear Wall

International Journal for Modern Trends in Science and Technology ISSN: 2455-3778 :: Volume: 05, Issue No: 08, August 2019

4 Pages
Posted: 3 Sep 2019

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Date Written: August 27, 2019

Abstract

Shear wall with openings are provided in apartment buildings so as to serve the purpose of windows in external walls or for doors ways or corridors in internal walls. Hence, to provide opening in wall the effect of different shape of opening is governed. The main aim is to find the effective shape which shows relatively similar or lesser results as rectangular opening and make it advantageous in architectural point of view. In order to minimize the effect of load at opening in the wall, different shapes such as rectangular, semi-circular, triangular etc. are analyzed. In present work, static analysis is performed by using ANSYS 16.0 software, in which parameters such as stress strain and deformation is obtained in the form of load transfer path. Maximum and minimum values are compared between the rectangular, semicircular and triangular shapes of specimen. The dimension of specimens are same in all cases, only the shape is varying.

Keywords: IJMTST

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Seismic Analysis of Step-Back Building Resting on Sloping Ground considering Different Types of Bracing System

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Date Written: August 12, 2019

Abstract

Buildings constructed in hilly areas pose special structural and constructional problems. Dynamic characteristics of hill buildings are different from the buildings resting on plane topography, as these are irregular and unsymmetrical in both horizontal and vertical directions. The irregular variation of stiffness and mass in vertical as well as horizontal directions, results in Centre of mass and Centre of stiffness of a storey not coinciding and not being on a vertical line for different floors. When subjected to lateral loads, these buildings result in significant torsional response. Due to site conditions, buildings on hill slope are characterized by unequal column heights which result in variation of stiffness of the columns of the same storey. The short stiff columns attract more forces and damage. The buildings resting on sloping ground mainly fails due to torsional moments which developed due to configuration of building on slope. These torsional moments may reduce by using bracing system in the buildings. In present study, Step back building with different types of bracing systems (i.e. X, V, Inverted V, Diagonal, bare frame) are considered. These models are analyzed by response spectrum analysis using ETABS v 9.0 finite element code. The dynamic parameters obtained from analysis have been discussed in terms of fundamental time periods, maximum top storey displacements, storey drifts and base shear compared within the considered configurations of hill buildings. At last, the effective type of bracing which can be used in step back building on sloping ground is found out.

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Seismic Analysis of RCC, Steel and Steel Concrete Composite Frame

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Abstract: ***In India, reinforced concrete structures are in greater demands in construction because the construction becomes quite convenient and economical in nature. The use of Steel in the construction industry is very low in India compared to many developing countries. From the recent researches it is evident that nowadays, the composite sections using Steel encased with Concrete are economic, cost and time effective solution in major civil structures such as bridges and high-rise buildings. In the past, for the design of a building, the choice was normally between a concrete structure and a masonry structure. In a recent trend, the composite mode of construction has gained several advantages in comparison with the conventional system construction. Due to the failure of many multi-storied and low-rise RCC masonry buildings from earthquake structural engineers are forced to look for the alternative method of construction.***

Steel-Concrete composite constructions are nowadays very popular owing to their advantages over conventional concrete and steel constructions. Hence the aim of the present study is to compare seismic performance of a 3D (G+8) storey RCC, Steel and Composite building frame situated in earthquake zone V. All frames are designed for same gravity loadings. The RCC slab is used in all three cases. Beam and column sections are made of either RCC, Steel or Steel-concrete composite sections. Equivalent static method and Response Spectrum method are used for seismic analysis. ETABS 2015 software is used and results are compared based on fundamental time period, displacements, base shear and storey drift. Comparative study based on seismic analysis concludes that, RCC construction is best suited for low rise buildings among all the three types of constructions.

Keywords: Low rise buildings, seismic analysis, Steel concrete composite construction, RCC, Response spectrum method.

I. INTRODUCTION

Most of the building structures in India fall under the category of low-rise buildings. So, for these structures reinforced concrete members are used widely because the construction becomes quite convenient and economical in nature. But since the population in cities is growing exponentially and the land is limited, there is a need of vertical growth of buildings in these cities. So, for the fulfilment of this purpose a large number of medium to high rise buildings are coming up these days. For these high-rise buildings, it has been found out that use of composite members in construction is more effective and economic than using reinforced concrete members. The popularity of steel-concrete composite construction in cities can be owed to its advantage over the conventional reinforced concrete construction. Reinforced concretes frames are used in low rise buildings because loading is nominal. But in medium and high-rise buildings, the conventional reinforced concrete construction cannot be adopted as there is increased dead load along with span restrictions, less stiffness and framework which is quite vulnerable to hazards.

Construction industry of India use very less steel as compared to other developing nations like China, Brazil etc. Seeing the development in India, there is a serious need to explore more in the field of construction and devise new improved techniques to use Steel as a construction material wherever it is economical to use it. Steel concrete composite frames use more steel and prove to be an economic approach to solving the problems faced in medium to high rise building structures. As we know, the building subjected to several types of forces in the lifetime such as Static forces due to dead load, live load and dynamic forces due to the earthquake and high-velocity wind. The rapid growth of urban population and limited land space have considerably influenced the developments of high-rise structures. Lateral loads are an important consideration as the building height increase. It is necessary to choose a structural system in such a way that it can resist lateral loads effectively. It is required to understand the behavior of structural systems in terms of stiffness and stability. Hence in the present investigation, comparative study of seismic analysis of RCC, steel and steel composite frame structure were performed and the effective type of building which performs better in earthquake excitations can be suggested.

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Seismic Analysis of Diagrid and Buckling Restrained Braced Structural System

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Abstract

Structural demands in high seismic zones require the use of strong lateral framing systems. Lateral load resistance of structure is provided by interior structural system or exterior structural system. The structure must have adequate strength and stiffness to resist smaller, frequent earthquakes with limited damage, but must also be able to sustain large inelastic cyclic deformations to economically assure safety and stability during large, infrequent earthquakes. The most frequently used lateral load resisting frames are the moment resisting frame (MRF) and the concentrically braced frame (CBF). Another prevalent structural system for today's buildings are diagrid structural system and Buckling Restrained Braced (BRB) system. Diagrid resist the lateral load by axial action of diagonal member provided on periphery of the structure and BRB structural system resist lateral load due to their significant ductility and energy dissipation capacity. Both system are used most effectively to reduce effect of lateral load on structure. The diagrid structures and BRB emerging as popular structural system in many developed countries of the world, but in India it is yet to gain importance. In the present study, to study the effectiveness of diagrid and BRB structure over conventional structures comparative analysis has been carried out. The comparative analysis of results are in terms of story displacement, fundamental time period, story drift and base shear.

Author Keywords

Diagrid structural system, Buckling Restrained Brace, Time history analysis, Peak Ground Acceleration

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Nonlinear Analysis of RC Structure under Multiple Earthquakes

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ABSTRACT

Earthquakes in the past have shown that a strong mainshock is often followed by aftershocks forming mainshock-aftershock series type of ground motions or multiple earthquakes. Aftershocks could occur after days, months or even years and although they are normally smaller in magnitude, their intensity can be large with different energy content than mainshock and pose a seismic hazard after a mainshock. The general approach of seismic design of structures usually considers a single earthquake but recent studies have shown that the mainshock aftershock records and interaction between these two should be evaluated to determine the likely damage behavior and responses of structure.Due to successive shaking of the ground over a short period of time, the damages in the structure gets accumulated and the structure becomes vulnerable to collapse. To understand the behavior of structure under such repeated ground motions or multiple earthquakes, non-linear time history analysis is carried out.

The present study considers a 12 storey reinforced concrete building. The building was analyzed for both linear and nonlinear time history analysis for 5-time history ground motions considering mainshock and mainshock-aftershock sequences. The material and geometric non linearities were accounted in terms of hinges and p-delta effects. It was found that the mainshock-aftershock sequence of ground motion has significant effect on the response of the structure in terms of top displacements and storey drifts. The analysis was carried out by ETABS 2016.

Keywords: *mainshock, aftershocks, nonlinear time history analysis, nonlinearities.*

I. INTRODUCTION

Multiple earthquakes occur at many regions of the world where complex fault systems exist. These fault systems usually do not relieve all accumulated strains at once when the first rupture takes place. Therefore, high stresses form at different locations causing sequential ruptures until the fault system is completely stabilized. This leads to the occurrence of aftershocks after a large mainshock. Aftershock sequences could last from minutes to years and cause seismic hazard.For instance the earthquakes in California (Mammoth Lakes, 1980; Coalinga, 1983; Whittier Narrows, 1987; Northridge, 1994), Italy (Friuli, 1976; Irpinia, 1980; Umbria-Marche, 1997; L'Aquila, 2009), Japan (Kobe, 1995; Niigata, 2004; Tohoku, 2011) were followed by aftershocks with equal or even higher magnitudes, among others. These sequences of earthquakes lead to accumulation of stresses and damages on the structures. Due to the short interval between successive seismic events there is least possibility of repair and retrofitting of the structure. Hence, the structure

Hydraulic Model Investigation on Stepped Spillway's Plain and Slotted Roller Bucket

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***Abstract*—In ogee spillway, the released flood water from crest to toe possesses a high amount of kinetic energy causing scour and erosion on the spillway structure. The dam projects normally have a stilling basin as an energy dissipater which has specific energy dissipation limitations. The stepped spillway is a better option to minimize kinetic energy along the chute and safely discharge water in the river domain. The Khadakwasla dam is situated in Pune, Maharashtra (India), and has scouring and erosion issues on the chute of ogee spillway and on the stilling basin. The present study develops a physical hydraulic model for the dam spillway with steps, plain and slotted roller bucket as per IS Code 6934 (1998) and IS Code 7365 (2010). Experiments were performed at heads of 4m (low head) and 6m (high head) on the developed physical models, namely on the plain and slotted roller bucket model for the ogee spillway and the plain and slotted roller bucket model for the stepped spillway. It was found that the plain roller bucket of ogee spillway dissipates 81.26% of energy at the low head, whereas the stepped spillway with slotted roller bucket dissipates the 83.86% of the energy at the high head.**

Keywords-stepped spillway; slotted roller bucket; physical hydraulic model; energy dissipation

I. INTRODUCTION

The toe portion of an ogee spillway plays an important role in dissipating specific energy and discharging floodwater safely on the downstream side. The released water acquires high kinetic energy at the toe of the spillway causing scouring and erosion of the channel bed. Stepped spillway is a better option to minimize the intensity of kinetic energy on its chute profile [1]. It discharges flood water safely and achieves significant energy dissipation along the chute due to the roughness of the steps. It thus reduces the length of the stilling basin. Many researchers performed experiments on stepped spillways and observed that energy loss mainly depends on the non-dimensional parameter of the ratio of critical depth to step height ($y_c/h \leq 0.8$) [2-6]. Energy dissipation is effective when the actual head is less than 1.4 times the design head [7, 8]. Stilling basin is generally preferred for guiding flow safely from the spillway to downstream river for energy dissipation [9]. The selection of stilling basin occurs on the basis of Froude number and the hydraulic jump characteristics. However, it requires a longer span to stabilize the flow in the downstream channel [10]. If the tail water is sufficient in the stilling basin for the development of the hydraulic jump, the roller bucket is the suitable option for energy dissipation [11, 12]. The provision of roller bucket minimizes the length of stilling basin, scouring and erosion on a downstream bed of a river [13]. In Khadakwasla dam spillway located in Pune, India there are issues in stilling basin and on ogee spillway chute due to improper energy dissipation. Plain and slotted roller bucket is a good option to overcome the scouring and erosion issues of the dam spillway [14]. The present study focuses on a hydraulic model investigation regarding the Khadakwasla dam with plain roller bucket, slotted roller bucket and modifications on stilling basin for ogee profile stepped spillway.

II. MATERIALS AND METHODS

In this study, a new methodology is proposed to minimize the issues of scouring and erosion by improving the performance of energy dissipation and minimizing the length of stilling basin. Khadakawasla dam is located on the Mutha river basin with a cultivable area of 677.43km^2 and annual irrigation capacity of 621.46km^2 in Pune district. It supplies Pune city with 280.3Mm^3 of water. The ogee spillway has a design discharge of 2700m^3/s, crest height of 23.75m, design head of 4.29m and 14 spans of 10m width.

A. Design of an Ogee Spillway

A physical hydraulic model was developed on the existing tilting hydraulic flume in the FM laboratory and designed with a model scale ratio of 1:33 [15]. The model investigation is done as per hydraulic similarities. Froude's model law and the model dimensions are shown in Table I.

B. Design of Stepped Spillway

The stepped spillway model is designed for a single span of 10m width with a scale of 1:33. The design is based on the Froude's model law as in [15]. The assumed hydraulic conditions are: i) The actual head should be less than 1.4 times the design head [7, 8], ii) tailwater depth is maintained in proportion with the sequent depth and the Froude number is more than 4.5 [11, 12]. The condition for effective energy dissipation is: If $y_c/h=2.5$, the profile surface is effective for energy dissipation, for $2.5<y_c/h<6$, the effect is still appreciable and for $y_c/h>6$, the energy dissipation starts reducing [16]. In the proposed ogee stepped spillway model (on prototype) the following parameters are estimated: y_c=3.35m, h=1.33m,

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Spatial and Temporal Analysis of Drought Using GIS Techniques

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***Abstract*: Drought is a natural disaster which leads to crops, food and water shortages along with destruction of ecological system. Drought are frequently occurring in our country in various regions so in Maharashtra in the satara district drought are occure in Man and khatav Taluka. In Satara District where about 80 percent of agriculture land is rain fed. Also this region is witnessing rapid urbanization due to which thirst for water for drinking as well as industrial use is demanding. The study of drought along various area is extremely important as it is related with crop farming and management of scarce water resource, which becomes critical in various of drought types. As the SPI-time scale is able to detect significant trend at rain gauge stations, number of stations having significant trend increases as the SPI time scale increases up to various SPI stations. This analysis of drought by using various method may help to solve problems related with floods, droughts and allocation of water for agriculture use, various industries, hydro-power generation, domestic use. With the help of SPI values we can study and gave solution to particular area according to severity of that area with help of severity chart of SPI method.**

To determine the severity of drought and the results of Standardized precipitation index are proven more accurate after studying using standardized precipitation index. We are preparing the triangular irregular network and after that we are trying to solve the problem of drought such that the suggesting crop patterns and also supplying water from the area were excess rainfall, takes place and by suggesting structure such as lakes, dams, etc., to overcome the problem of drought. By studying the topographical maps also finding economical way to supply were to the area with maximum efficiency also.

***Keywords*: Drought area, SPI Values, GIS Study, TIN model.**

1. Introduction

Drought is one of the most devastating natural disasters that often affect human life and performance. Drought indicators for drought monitoring analyse data from thousands of information about relative humidity (RH), rainfall, temperature, flow, wind speed, humidity, etc., and data at different times. It is very difficult to pinpoint the beginning or the middle of the period or even the end of the drought as a prediction of this phenomenon.

The concept and definition of drought depend on the natural weather conditions, agricultural methods, existing water resources, and the various economic and social characteristics of the various regions. The arid and semi-arid regions are more.

Vulnerable to drought in the world, which occurs in many different ways, and this is the same in India and particularly in parts of Maharashtra. There are different interpretations of the drought between different researchers, and some researchers consider the high rainfall to be a sign of drought in a short period of time, but this short period of good rainfall may not be stable, so we need to look at the historical data in the long period. The evidence and effects of drought and the increase in drought in India have been increasing rapidly in recent years.

To obtain the amount of drought occurring in the area as well as predicting future droughts, it is necessary to use different models of meteorology and satellite imagery, but some of these variations of droughts can also be derived from a historical survey of rainfall and humidity and change the air temperature is also checked.

Standardized Precipitation Index (SPI) use to study drought analysis and monitoring systems because it is suitable for different climate zones in the country, but maybe because India is a wide country and there are different climate in the country so it needs to look at what type of indices are used in each area. The SPI index calculates the drought in a region based on rainfall and can be used at different time scales. This indicator can be useful for both applications in agricultural and long term hydrological indicators. The SPI classification is shown in terms of rainfall, calculated at 3, 6, 9 or 12, and more often as severe aggression. When a drought occurs, the SPI is consistently negative and reaches a peak of -1.0 or less and when the SPI number is positive, it shows the wetness and absence of drought in the region. GIS Study prepare TIN (Triangular irregular network) model of drought area. Use GIS software to give solution for minimize drought problem by using various methods.

2. Literature Review

"Drought monitoring and analysing on typical karst ecological fragile area based on GIS"- Jiang Tao, Zhou Zhongfa and Cao Shui (2011).

This paper examined the various drought prone region of south west china using drought assessment system based on GIS with its strong managing and analysing function and this study shown the drought situation, grade and relief time of

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Energy Dissipation in Solid Roller Bucket and Controlled Stilling Basin for Ogee Stepped Spillway

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Abstract: *Hydraulic jump type II stilling basin is generally preferred as an energy dissipator for ogee spillway but it is uneconomical due to longer structure. On the other hand, roller bucket uses relatively shorter structure over a sloping apron or horizontal stilling basin. In this study, an attempt has been made to evaluate the performance of an ogee profile stepped spillway in combination with solid roller bucket and stilling basin type II for energy dissipation. Laboratory experiments are performed on a physical working model of ogee profile stepped spillway at discharge ranging from 0.0032 to 0.0069 m^3/s for a head of 1.5m, 4m & 7m and the results compared for energy dissipation (non-dimensional parameter (y_c / h) = 0.69). The model results show that stepped spillway model without v-notch achieves 92.40 % energy dissipation. Thus this model is found to be more suitable to acquire the ideal condition of sequent depth and tail water depth in stilling basin for all the discharges.*

Keywords: *Energy dissipation, Controlled stilling basin, Non-dimensional parameter, Ogee stepped spillway, Solid roller bucket.,*

I. INTRODUCTION

Terminal structure of an ogee spillway plays a vital role in dissipating specific energy of flood water so as to safe guard downstream structure of dam. Due to high discharge of excess floods there are chances of erosion of spillway bed. Therefore in all circumstances the energy dissipator must be adequate and efficient to dissipate the specific energy effectively. Different types of energy dissipators *namely* stilling basin, roller buckets and flip bucket are used in ogee spillway for minimizing its impact on the ogee structure. The provision of steps on ogee profile acts as roughness element to decrease flow acceleration and toe velocity [2]. The decrease in velocity and entrainment of air reduces cavitation in the spillway. Excess air entrainment causes positive pressure on spillway bed and is helpful to enhance energy dissipation [9].

However roller buckets requires unit discharge less than 50 $m^3/s/m$ to dissipate the specific energy effectively on ogee spillway chute [1]-[10].

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Thus there is a broader scope to utilize combined effect of steps, solid roller bucket and hydraulic jump type of stilling basin on ogee spillway. Ogee spillway of Khadakwasla dam, Pune has stilling basin type of energy dissipator with friction blocks. The problems like scour, erosion, and formation of pot holes are reported by dam inspection authority, central design organization, Nashik (India). In this present study, an attempt has been made to develop a physical model of ogee stepped spillway with solid roller bucket and controlled end sill type stilling basin for Khadakwasla dam spillway, Pune (India).

II. METHODOLOGY

In this model the combination of hydraulic jump type II stilling basin and solid roller bucket is used as an energy dissipator for evaluating the performance of ogee stepped spillway. The performance of stilling basin is helpful in identifying the ideal condition of tail water depth (y_t) for different discharges and heads. Sequent depth ratio (y_2/y_1) and tail water depth ratio (y_t/y_2) is observed in the model for determining efficiency of the stilling basin. The tail water depth deficit in Khadakwasla dam spillway is needed to overcome with controlled stilling basin [11]. In this study a new methodology is proposed to modify the length of stilling basin with controlled end sill for both ogee and stepped spillway. The ogee spillway is designed as per IS 6934 and roller bucket is designed as per IS 7365, 2010 [5]-[6]. The working model of ogee stepped spillway is developed on the basis of Froude model law with a model scale ratio of 1:33. The conditions assumed in the model development are i) The operational head of water over the crest of ogee spillway is less than 1.4 times design head ii) The solid roller bucket is kept under submergence with tail water in the range $y_t = 1.1$ to $1.4^* y_2$ ii) $Fr_1 > 4.5$ for solid roller bucket and iv) Non-dimensional parameter defined as the ratio of critical depth (y_c) to step height (h) for stepped spillway, $y_c/h < 0.8$ [3]-[4]-[7].

The experiments are performed in a 6 m long, 300 mm wide and 300 mm deep tilting hydraulic flume for discharge ranging from 0.003 to 0.007 m^3/s. Steps are provided on ogee spillway chute with a slope of 0.75:1. Number of steps = 9 with a rise = 4.5 cm, tread = 5.0 cm and rise to tread ratio = 0.9 is used for stepped spillway. The performance of stilling basin is tested under the operational head of 1.5 m, 4 m and 7 m. The y_t is controlled in stilling basin by the provision of v-notch on end sill.

Experiments are performed with and without v-notch under different tail water conditions for ogee and stepped spillway. Fifteen models are studied to check the performance of

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AMBIENT AIR QUALITY ASSESSMENT STUDIES IN INDIA: A REVIEW

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Abstract
Various researchers have worked on the persistent and aggravating problem of air pollution all over the world and especially in developing countries like India. It is a matter of great concern for authorities and environmentalists to seek a balance between progressive technologies and environmental well being. It is seen through outcomes of these researches that air quality is directly affected by a multiple parameter, commonly identified as rapid industrialization, commercialization, transportation and other domestic activities. It is seen that the air quality deterioration is predominantly seen in urban areas of country mainly due to vehicular emissions and in rural areas due to use of domestic fuels like burning of wood, biogas, etc. Over the years commonly identified pollutants are SO_2, NO_x, $PM_{2.5}$, PM_{10} various analysis and assessment techniques using these pollutants include majorly AQI and API using standard permissible values and ranges prescribed as per NAAQS (National Ambient Air Quality Standards), USEPA (EPA-1997,1999). One of the researchers [8] also used air quality modeling (ISCST-3) as a tool to determine maximum allowable concentration of pollutants. Some researchers [8,18] concentrated on parameters like SPM and RSPM.

Keywords-ambient, pollutants, SPM, RSPM, air quality, particulate matter

I. INTRODUCTION

Ambient air quality is the most important thing as oxygen content in the air is the direct measure of the purity of the air, to be categorized as respirable or non respirable conditions. A large number of pollutants present in ambient air due to various number of sources i.e domestic, traffic and most important industrial sources needs to be studied. A lot of observations and experimental studies have been carried out and still going around us to quantify and measure the pollution levels. It is seen that different sources contribute to different types and concentrations of pollutants. Lot of researchers has carried out extensive studies to identify measure and formulate the source, cause and effect of pollutants. This paper presents a review of work and outcomes of various researchers through their studies, observations and experiments. It gives an overview of some empirical findings, developed equations, and methodologies adopted by the researchers to identify and quantify the problem of pollutants at different places in India. An attempt is made to summarize all the different findings of work of researchers.

Studies and Methodologies:

Vijai Verma, et al (2010)[18], used High Volume Sampler (HVS) with a flow rate of 1-1.3 m^3/min for SPM and RSPM and flow rate of 0.5lit/min for SO_2 and NO_x as per standard method prescribed by CPCB. Air Quality Rating was obtained using expression:

$$Q = (V/V_s) \times 100$$

V: Observed value
V_s: Standard Value

Considering all the parameters and taking mean of each, gives quality rating and AQI. Researchers [5,10,13] carried out ANOVA showing significant mean squares due to years, seasons and locations affecting all four variables. Referring to ambient air quality standards of CPCB, it was observed that annual average of SPM and RSPM of all samples exceeded the standard limits of 200 $\mu g/m^3$ and 100$\mu g/m^3$. Highest concentration of SPM was recorded as 532.31$\mu g/m^3$ at a major traffic flow. Maximum RSPM recorded was 224.81$\mu g/m^3$ [5, 13]. Average concentration of SO_2 and NO_x were within permissible limits at all study locations. Researchers also calculated AQI for more accuracy and compared the values with quality ratings in residual zones as per CPCB along with Air Quality Category (AQC) for all locations and found that all commercial locations were heavily polluted and all residential locations were heavily polluted [10]. Researchers also concluded that open areas have

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Failures of Gabion Walls

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Abstract: Retaining wall is an important structure of any infrastructure. Due to research and advancement in Civil Engineering use of new types of retaining walls are very much common in recent construction scenario. Gabion retaining wall is one of the new types of retaining wall. Gabion wall consists of stone filled metallic mesh boxes which are tied together to form a shape of retaining wall. Gabion wall is very much common nowadays due to its simplicity, speedy construction, and flexibility. In spite of massive structure of Gabion wall there are possibilities of Gabion wall failures. Literature review shows that very less information is reported on failures of Gabion wall.

This paper focused on defects/ failures observed in existing Gabion walls. Total 11 sites of existing Gabion walls around Pune district (India) are considered for the study. Investigations of these sites are made to identify various defects/failures with possible reasons. Remedial measures to overcome these deflect/failures are also suggested. Such a study will be helpful not only to avoid failures but also to provide a basis for possible research and modifications in the Gabion wall.

Index Terms: Gabion wall, Defects/ failure of Gabion wall, Bulging, Corrosion.

I. INTRODUCTION

Retaining wall is constructed to retain earth, avoid landslides. Landslides scenario in India is very serious [15] for which retaining wall may be an effective method. There are different types of conventional retaining walls like masonry/concrete gravity wall, RCC cantilever/counter fort/ buttresses. There are also an advanced type of retaining walls like MSE (Mechanically stabilized earth) wall [18], Gabion wall [17] etc.

Gabion wall is a gravity type retaining wall in which boulders are filled in box type cages formed by standard net made of steel wires of diameter ranging from 2.2 to 3.4 mm zinc and/or PVC coated having mesh opening sizes of 60x80mm, 80x100mm, 100x120mm and box sizes in multiples of 0.5 m [2 & 3]. Gabion wall is very much common nowadays due to its simplicity, speedy construction, and flexibility. Gabion wall has a wide range of applications like stream bank stabilization [16], Gabion-stepped Weirs [20], Landfill embankment for dumping site [14], acoustic performance [12], flood protection work [21], Energy dissipation Gabion Stepped Weir [22], gabion mattress for canal erosion prevention, earth retaining structure, [13].

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Poor performance, defects, failures of various types of advanced retaining walls (MSE, Geo-textile wall) has been reported [4, 5 & 6]. Study on field performance of such advanced type of retaining wall is also made by different researchers [8, 9, 10 & 11]. Kenneth L. Carper has presented case studies of structural failure during construction and stressed need for strict quality control during construction to avoid financial and human loss. [7]. As far as Gabion wall failures is concerned, limited literature is available. Edward A. Nowatzki & Brian P. Wrench has presented Geotechnical Investigation on Causes of Failure of a Gabion Retaining Wall. They concluded that poor quality of backfill soil and flood situation is responsible for instability of Gabion wall [19]. Output received through the case studies of failures will provide guidance to engineers, designer to avoid similar errors, precautions required to build more stable and reliable structures. For an engineer, knowledge about engineering failures is sometimes more important than knowledge about its successes. To improve the safety of Gabion wall structures, failure studies are necessary both to explicate the common mistakes that have caused their malfunction and to offer guidance for future engineering practice. Author 1 is currently doing his PhD work related to modification of Gabion wall. It is essential to know current status of existing Gabion walls. Accordingly, Author has visited number of existing Gabion wall sites. During his observations it is found that some of Gabion walls are not performing well and some of them are on verge of failure. This has motivated to present a collective report related to Gabion wall failures based on sites investigation. The observations related to various failures cases of Gabion walls reported in this paper will provide a basis for further detailed case study and possible modifications in the Gabion walls. The area considered for the study is Pune district (India), which is part of Deccan Traps; the large igneous province has average mountainous terrain and moderate rainfall. In this study, 11 existing sites of Gabion wall from this area are considered for the study. Each of these sites is physically investigated to identify present performance. Various defects and failures with possible reasons for the occurrence, observed for each type of wall are presented in this paper. Suggestions to reduce and avoid such defects/failures are also mentioned at the end.

II. SITE INVESTIGATION

Site 1- This site is at Dr.B.R.Ambedkar Bridge Sagnvi, Pimpri-Chinchwad.

This is constructed by metal Gabion wall on the west side river bank of Pawna River to avoid bank erosion and retain the earth fill. Average height is 8m and the base width is 7m and length is 500m as shown in Fig. 1 and Photo 1.

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Techno-Economical Analysis of Gabion Retaining Wall Against Conventional Retaining Walls

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Abstract - *For a particular local condition selection of inappropriate conventional methods used in the construction of retaining wall proves not only time consuming but also costlier due to the transportation of required materials and its associated cost. Selecting most technically appropriate, safe and cost-effective system out of the various available types including rubble masonry gravity wall, RCC cantilever wall, RCC counterfort wall and gabion retaining wall is a rigorous task. Present work addresses a comparative techno-economical analysis of various conventional retaining walls with the Gabion wall. While performing the design procedure the input data including height, backfill, foundation strata and loading conditions are kept constant for all the four type of retaining walls. From the design output in the form of section and steel, it is observed that the retaining wall of Gabion type proves economical and effective compared to other wall considered for analysis. The locally available materials are the key elements which can be used in the construction of gabion walls makes the project time bound and cost effective.*

Key Words: **Retaining wall, Gabion wall, Design of retaining wall, cost effectiveness.**

1. INTRODUCTION

Retaining wall is structure which restrain soil of unnatural slopes [4]. They are used to bound soils between two different elevations often in areas of terrain possessing undesirable slopes or in areas where the landscape needs to be shaped severely and engineered for more specific purposes like hillside farming or roadway overpasses [2].

Retaining walls are classified as follows of

Based on Material Used- Concrete, Brick/stone masonry, Clay/Soil Timber

Based on resisting the load-

Gravity Wall- A massive wall that resists, overturning by its own weight.

RCC Cantilever wall- Wall constructed in RCC having thin stem and base slab resist load by cantilever action. It is generally economical up to about 7m in height.

RCC Counterfort wall- When height of wall is more than 6-to 8 m Steam and base slab at regular interval tied with counterfort for economy

All the types of wall explain above have some disadvantages [14] i.e. require more cross section area, slow speed of construction work, Costly [1], may not suitable in water prone area[3] having weak foundation strata. A gabion wall is gravity wall having advantageous points as easy drainage [13], cheaper, flexible (differential settlement can be tolerate), speedy work, wastage materials can use and having no hydrostatic pressure, huge structure like landfills [12]. Above advantageous point attract the researchers to compare the Gabion wall with conventional retaining wall, to check feasibility and economy.

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2. MATERIAL AND METHOD

Gabion Wall is nothing but Boulder filled box type cage formed by Standard nets made of steel wire or polymer ropes. The netting is from mechanically double twisted hexagonal wire mesh made of Heavily Galvanized steel wire. The boxes are properly wired and laced together to form flexible, monolithic, confined building blocks, which are called as Gabion walls. Gabions in conjunction with boulders act as wall which retains water or soil as water front structures, as bridge abutment retaining structures and as slope stabilizing, erosion controlling systems, aprons and revetment construction etc. These walls are porous gravity walls, which stand by self-weight and it does not require any foundation or anchorage. Gabions can be used effectively and economically in its all applications. Gabions are classified in two categories as Metallic Gabion box & Polymer Gabion Box.

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TO EXTRACT GFC'S FROM CLASH FREE AND WELL COORDINATED REVIT MODEL

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Abstract - *Clash detections is the process of finding where the "Clash" elements of separate models occupying the same space, or with parameters that are incompatible. Finding these inconsistencies is vital, as they would severely impact the construction process, causing delays, design changes, materials costs and a cascade of headaches and budget over-runs. Clash detection was a manual process of overlaying drawings on a light table to visually see clashes a long time ago. 2D CAD operated essentially did not help in this arena . BIM tools can be used for effective and accurate clash detection for 3D digital models. Clash detection is an important and integral part of the BIM modeling process. In BIM modeling, there are several models. They are in the end integrated into a composite master model. This project is about developing Structural and Architectural 3D BIM model and using clash detection tools to detect various clashes and resolve them. These corrected models can be used to extract GFC's (Good for Construction) drawings that are used for on-site execution.*

Keywords: Clash Detection, GFCs, 3D Model Rendering

1. INTRODUCTION

In the last few years the construction industry, the complexity of modern day construction projects has increased and no significant improvement in the productivity of the construction industry has been observed. The productivity of the construction industry has traditionally been much lower than that of other industries because the main reason for this shows to be the incapability of new technologies. As other industries have improved their productivity by using new modify methods and techniques, the construction industry is also applying new technology such as building information modelling (BIM) to assist better the productivity of construction Project Management. A BIM method is consisting of the 3D models of the project which links to all the required information connected with the projects planning and construction or operation.

BIM is a 3D modelling which may involve 4th dimension as time (4D), 5th dimension of cost (5D) and information database of the project, 6D dimension is related to Facilities Management (FM) 7D dimension is related to sustainability. BIM allows a team to collaborate at a level with efficiency previously unavailable in the industry. The drawing sets are more coordinated. You can find problems in the drawing sets prior to the construction process. BIM helps to reduce time and cost of the project, etc. A lot of market researches show that the future of building design and construction will increasingly rely on BIM. It is no longer the future of construction and design industry, it is becoming the standard.

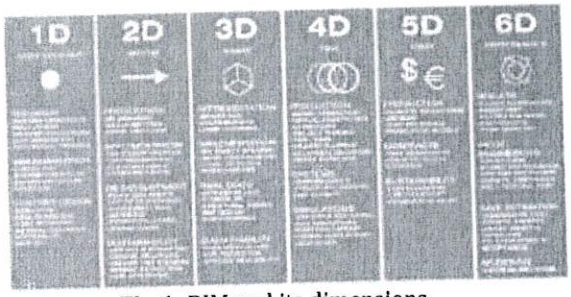

Fig-1: BIM and its dimensions.

2. LITERATURE REVIEW

Lino Maiaa, Pedro Medab and Joao G. Freitasa explained how BIM methodology introduces noteworthy changes in the way as building design, construction and maintenance are traditionally managed. This paper explores and evaluates the advantages and disadvantages of BIM methodology application on the preparation, revision and coordination of designs, as well as the analysis of the computational tools available. Using the Revit software, a building was modelled in BIM based in the design drawings carried out by using the traditional methods in CAD. BIM methodology intents the integration of all phases of the construction process, i.e. the integration and promotion of collaborative work by all the design disciplines involved in the design phase. Besides, it is supported by three-dimensional visualization applications. The great potential of BIM concept is also in standardization of information and of methods to perform the objects modelling process. Based on this, potential improvements in the preparation, coordination and revision of design documents, and management and maintenance are done. The BIM concept has assumed different definitions. Its uses in mass has generated discussions about the validity of the

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Modeling of Chlorine and Coagulant Dose in a Water Treatment Plant by Artificial Neural Networks

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***Abstract*—Coagulation and chlorination are complex processes of a water treatment plant (WTP). Determination of coagulant and chlorine dose is time-consuming. Many times WTP operators in India determine the coagulant and chlorine dose approximately using their experience, which may lead to the use of excess or insufficient dose. Hence, there is a need to develop prediction models to determine optimum chlorine and coagulant doses. In this paper, artificial neural networks (ANN) are used for prediction due to their ability to learn and model non-linear and complex relationships. Separate ANN models for chlorine and coagulant doses are explored with radial basis neural network (RBFNN), feed-forward neural network (FFNN), cascade feed forward neural network (CFNN) and generalized regression neural network (GRNN). For modeling, daily water quality data of the last four years are collected from the plant laboratory of WTP in Maharashtra (India). In order to improve performance, these models are established by varying input variables, hidden nodes, training functions, spread factor, and epochs. The best models are selected based on the comparison of performance measures. It is observed that the best performing chlorine dose model using defined statistics is found to be RBFNN with R=0.999. Similarly, the CFNN coagulant dose model with Bayesian regularization (BR) training function provided excellent estimates with network architecture (2-40-1) and R=0.947. Based on the above models, two graphical user interfaces (GUIs) were developed for real-time prediction of chlorine and coagulant dose, which will be useful for plant operators and decision makers.**

Keywords-artifical neural networks; chlorine dose; coagulant dose; water treatment, modelling

I. INTRODUCTION

Water treatment consists of many complex physical and chemical processes. The efficiency of these processes is accomplished by examining the quality of outlet water. Generally, in India, WTP operators take necessary remedial measures for water quality improvement using only their experience. This practice is inefficient and time-consuming in monitoring real-time responses [1, 2]. In a WTP, coagulation and disinfection are essential treatment processes as they assure the supply of safe and clear water. Conventionally, chlorine is the most widely used disinfectant, and aluminum sulphate (alum) used as a coagulant due to its high efficiency and low cost. Mainly, two common vital factors, turbidity and applied dosages, decide the effectiveness of chlorination and coagulation [3]. Turbidity provides a shield to microbes, which reduces the efficiency of chlorination. It raises chlorine demand, which results in less availability of residual chlorine in water distribution networks (WDNs) [4, 5]. In India, WDNs are old, have leakage issues responsible for microbial contamination, and there is a tendency of plant operators to apply higher chlorine dose for maintaining the desired residual chlorine in the WDN. The high chlorine dose increases the probability of trihalomethane (THM) formation. Consumption of THM containing water creates adverse effects on human health such as high blood pressure, reproductive system disorders, and cancer inception [6]. A chlorine predictive model will help monitoring the process and avoid complex laboratory analysis, which requires more time and money.

Coagulation and chlorination processes show non-linear nature that is hard to express using linear mathematical models [7]. It is difficult to model water treatment processes due to complex interactions among many chemical and physical reactions. Thus, the application of ANNs is considered for the prediction of optimum coagulant and chlorine dose. An ANN is a biologically inspired system consisting of a number of interconnected elements called neurons. These neurons are arranged in input, hidden and output layers. All the layers are well connected like human brain synapses where weights are optimized by using input and output variables [8]. An ANN has the ability to learn and model non-linear and complex relationships. Several studies have been carried out on the prediction of the coagulant dose for particular WTP [9-15]. RBFNNs and GRNNs have shown good performance capabilities for predicting residual chlorine in WTP [16]. Thus, two ANN models are explored for prediction of coagulant and chlorine dose for a major WTP of Pimpri-Chinchwad Municipal Corporation (PCMC), Maharashtra, India.

II. MATERIALS AND METHODS

A. Study Area

The WTP under study is located in PCMC, Maharashtra, India, 18°37'33.87" N and 73°48'43.76"E. This WTP supplies 428MLD of water to an area of 177km^2 with 117,936 water connections and 59 elevated service reservoirs.

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19-20

Micromechanical Modelling of SiC reinforced in 8090Al-Li alloy Metal Matrix Composite

scopus

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Abstract

In the present study, the stress transfer efficiency between matrix and particulate and deformation has been carried out for RVE of a particulate reinforced metal matrix composites (MMCs) by developing a micromechanical model. It is observed that the stress transfer efficiency decreases with increase in particle volume fraction. The maximum and minimum stresses are induced in the direction and 90° to the direction of applied load respectively. The particulate reinforced metal matrix composite is the brittle particle (silicon carbide) reinforced in ductile matrix material of 8090Aluminium-Lithium alloy material.

Keywords: *Finite Element Analysis, SiC reinforced MMC, particle matrix interface.*

I. INTRODUCTION

Aluminium alloys are used in huge demand in today's world due to its distinguished properties like easier to recycle, good toughness, light weighted, high specific strength, high resistance to corrosion in sea water, good weldability and brazability, which makes it suitable for a wide variety of applications in various industries like aerospace, marine fittings, automotive. The limitation in usage of

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Cloud Computing based Wireless Sensor Network in Data Transmission With Routing Analysis Protocol and Deep Learning Technique

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Abstract: Wireless sensor networks are required in an extensive variety of essential applications that collect and analyse data from the corporeal environment. A similar need for remote resource sharing exists in cloud computing, which uses a standards-based methodology. A very promising technology called Sensor Clouds is created by applying wireless sensor networks' shared sensor resources while utilising the cloud computing framework. This study offers an innovative cloud-based wireless sensor network in cloud data transmission and routing analysis utilizing deep learning technique. here the cloud based data has been transmission using wireless sensors in cloud module. Then the data routing is done for trained data where the training is carried out using fuzzy convolution based secure routing. An assessment of the empirical data has been done in perspective of validation accuracy, throughput, packet delivery ratio, end-end delay and QoS. The recommended approach accomplished validation accuracy of 95%, throughput of 93%, packet delivery ratio of 72%, end-end delay of 55% and QoS of 73%.

Keywords: *Wireless Sensor Networks, Cloud Computing, Cloud Data Transmission, Routing Analysis, Secure Routing*

1. Introduction

The capacity of wireless sensor networks (WSNs) to collect data as well as the data processing and storage capabilities of mobile cloud computing (MCC), WSN-MCC integration is garnering a lot of interest from both academics and business. By defining the fundamental problems with WSN-MCC integration and offering a framework for the processing of sensory data, we may concentrate on the transmission of the desired sensory data to the mobile users in a quick, dependable, and secure way [1]. With the help of cloud computing, businesses can expand their capacity quickly without having for investment in new infrastructure, in addition to it, reduce capacity instantly with effectively. The "Using the cloud for distribution and consumption paradigm For several IT-based applications, the customer simply sees the service and doesn't need to understand how it was implemented [2]," depending on a recent IBM research. "Cloud Computing is a methodology for giving access to a common pool of resources via a handy, on-demand network programmable computing resources," claims the US National Institute of Standards and Technology. The cloud provides access to a variety of services, applications, information, and infrastructure through pools of computing power, network, information, and storage resources. An on-demand utility-like prototype of allocations and consumption is possible with the rapid orchestration, provisioning, implementation and decommissioning, and scaling up and down of cloud components [3]. The five key elements of cloud computing are on-demand self-service, wide network access, resource pooling, quick elasticity, and measured service, according to NIST [4].

2. Related Works

Environmental monitoring to medical applications like Alarm-Net and CodeBlue have all made extensive use of wireless sensor platforms [5]. Although the fundamental issue, remote monitoring utilising sensor networks, remains, These systems' architectures have been designed to created in a fairly ad hoc manner and is not adaptable to modify to various applications or circumstances. Many researchers have been looking into methods for syncing wireless sensor

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Method to play computer games using Machine learning and AI algorithms

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Abstract—Today, we strive to create better and better human beings every day, in every field. Games have existed in human history ever since a long time and are responsible for developing various qualities in humans like strategy developing, decreasing response time etc. So, in this paper, we put forward a method in which a computer will learn how to play computer games using machine learning and AI algorithms and the computer will master the game. We can then use this computer to train humans while allowing them to compete them against the computer and the best part is the computer will constantly be learning the player's moves and getting better and better so as to create a healthy, tough competition for the human.

Keywords—Machine Learning, Artificial Intelligence, Genetic Algorithms, Artificial Neural Networks.

I. INTRODUCTION

Any game can be represented as an optimization problem that can be maximized to produce an efficient problem.[2][10] Due to the advancement in technology and evolution of genetic algorithms like Convolutional Neural Network (CNN), Artificial Neural Networks (ANN), computers can now perform a lot of computationally difficult tasks very easily and optimally. So, we decided to use this computational power to create an expert system that will learn to play computer games. In brief, we will be using CNN to analyze the screen on which the game will run, pixel by pixel. This CNN will then report the current status of the game to the computer[3]. User(human) will have already given the set of inputs the game requires (example: Keystrokes that move the game character or objects). The ANN will then use this set of inputs to play the game. So, using the combination of genetic algorithms [4]; CNN and ANN we can train our bot to play the game and demonstrate how to excel the game or to show how the particular game can be played ideally.

II. RELATED WORKS

Since Machine Learning is an emerging field and lot of research is currently being done by various experts of computer field. All the previous works we found we done on a very basic game with limited number of moves and a short play area. Author Jason Lewis has used ANN for solving the game of Tetris. Training a bot for game like Tetris can be done very quickly with today's advancement in technology. [2]. Authors Jose M.Font & Tobias Mahlmann describes in detail how MOBA(multiplayer online battle area) supports AI techniques in the video game industries.[5] Authors Michael Dann, Fabio Zambetta, John Thangarajah (2018) have used similar technology to develop and train their bot for playing the game INFINITE MARIO.[1]. In this paper, the authors have use Machine Learning algorithms to solve the navigation tasks in Infinite Mario. Again, the objective of this game is simple. The player moves either right or left and completes the maze-like path to reach the goal state i.e. win the game.

III. SCOPE OF THE PROJECT

We will be using the machine learning algorithms and techniques to train a bot which has to perform complex tasks. So basically, the range of inputs will be higher, the objective of the game will be difficult to achieve (as per human standards) and the path that the character has to traverse will be very complex which will again be solved using algorithms like shortest path algorithms.[8] By the end of the project, the developed game bot will not only be able to play the complex game but will also demonstrate how to efficiently complete the game in optimal time span. The bot will be developed such that it has minimal time and space complexities, will be portable i.e. the bot can be transferred from one machine to another without affecting the performance of the bot and will be machine independent. To make the bot efficient, it will be rigorously trained for ample amount of time so that it can overcome any hurdle or new additions in the original game.

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Secure Anti-Collusion Data Sharing Methods for Dynamic Groups in Cloud

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ABSTRACT

In this system users can achieve an effective and economical approach for data sharing among group members in the cloud with characters of low maintenance and little management cost. Proposed system must provide security guarantees for the sharing data files since they are outsourced. Due to the continuous change of the membership sharing data while providing while giving security protecting is still challenging, especially for an untruth cloud due to the collusion attack. In existing systemthesecure key distribution is based on the secure communication channel, however to have such a channel is strong assumption and is difficult for practice. In this system we propose a secure data sharing scheme for dynamic members.In proposed system first propose is secure way for key distribution without using any secure communication channels, anduser can securely obtain their private keys from group managers.The system can accomplishes fine grained access control any client in the gathering can utilize the source in the cloud and disavowed clients can't get to the cloud again after they are denied. Also the system can protect the system form collusion attack, which means that users cannot get original data files even if they conspire with entrusted cloud.

KEYWORDS: Access control, privacy-preserving, key distribution, cloud computing.

I INTRODUCTION

Another type of internet based computing is a cloud computing which provides shared computer processing resources and data to computers and other devices on demand. It is a computing style which provides dynamically scalable and often virtualization resources as a service over internet. Data storage is one of the most fundamental services offered by cloud providers. Consider a practical data application in a company allows its staff in the same group or department to store and share files in the cloud. It also causes risk to confidentiality of stored records. Specifically cloud providers are not fully trusted by users because data files stored in the cloud may be sensitive such as business plans. To maintain the data privacy solution is to encrypt data files and the upload the encrypted data into the cloud. One of the most significant obstacles of the cloud computing is identify privacy. So

Congestion Control in Optical Burst Switching Networks Using Differential Evolution Optimization

Deepali Ujalambkar and G. V. Chowdhary

Abstract Optical burst switching (OBS) is a trade-off between optical packet switching (OPS) and optical circuit switching (OCS). OBS is different than these two concepts which allow transmission of control packet separately over reserved optical channel. The most challenging task in OBS is congestion which varies as per the traffic load. In this paper, differential evolution (DE) optimization algorithm is presented for congestion control in OBS network. The performance of DE is evaluated primarily for the total number of congested links against total load and second for the total number of hops against load in the network. This was evaluated on the basis of reduction in the number of congested links. These simulations were carried out for different sparse and dense network like ARPANET, NSFNET, RANDOM-12, and TORUS-9 topology. The results of the same were compared with conventional Dijkstra's shortest path (SP) algorithm, which is widely used as a routing technique and DE exhibits better result.

Keywords Congestion control · Differential evolution (DE) · Optical burst switching (OBS) · Sparse network · Dense network

1 Introduction

In today's world Internet is widely developing the communicating media and to cope with the users demand and make effective utilization of bandwidth, wavelength division multiplexing has become the obvious choice for backbone networks systems and have been deployed in many telecommunications backbone networks. There are multiple communication channels associated with each fiber and each channel is functioning on different wavelength. To exploit the terabit of bandwidth of WDM, optical burst switching (OBS) has been projected as a considerable [1]. Optical burst

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Design and Development of Beach Cleaning Machine

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Abstract: Due to incident of high tide occurred in Mumbai beaches which washed ashore 3 million tons of garbage to the sea shore in June 2018.3 million ton is a big number. How this garbage did come from sea? Its the garbage discarded by man itself and waste of the sea just took those debris into its vicinity and at the moment of high tide, it throws the garbage offshore. So we have decided as we cannot manage the natural phenomenon such as high tide but we can control the outcomes like cleaning the beaches regularly and manual cleaning is not possible. So we are developing a protocol which will clean all this debris. Protocol which we are going to develop consists of an engine which runs through fossil fuel which drives the entire process. The waste is collected through conveyor blades and sand which falls off through perforated conveyor belt to the sand bed, separation of waste material takes place through principle of density difference hopper is attached to it so garbage can be collected in it.

Keywords: Beaches, high tide, cleaning the beaches, conveyor blades

I. INTRODUCTION

The coastal beaches are the main attraction for tourism. To attract tourists, the beach must be kept clean. To clean the beach, some cleaning machine must be used. So we have manufactured a cleaning machine which helps clean the beaches.
The motor is responsible for the driving mechanism of the conveyor. The strainer attached to the conveyor will collect the wastages from the surroundings and transfer it to the storage bucket through the conveying belt. Today's era is moving towards being digitalized and automated. The youth want everything easy and smart. Anywhere you go, you get easy technology availability. So we thought of using this technology and adding more to it for our final year project. Nobody likes to suffer and wait just to get good surroundings. To avoid this and to save the time of our waste management system, we are creating an application called "Smart Cleaning System". For that, we are using the system by which a beach cleaner can do his work smartly using technology. Smart Cleaning System is proposed to overcome real-time problems. With the continued expansion of industries, the problem of water must be urgently resolved due to the increasing sewage problems from industries. The waste produced from the industries is very harmful to human beings and the environment. Through this smart waste management system, workers can maintain all his health and work well through the application. One more useful and important advantage of our system is that the worker can replace the manual work at the beach through this semi-mechanical beach cleaner having easy access. A beach cleaner is a vehicle that drags a raking or sifting device over beach sand to remove rubbish and other foreign matter. They manually pull the vehicles on tracks or wheels. Seaside cities use beach cleaning machines to combat the problems of litter left by beach patrons and other pollution washed up on their shores. The main task in beach cleaning strategies is to find the best way to handle the waste matter, taking into consideration of beach erosion and changing terrain. Beach cleaning machines work by collecting sand by way of a scoop or drag mechanism and then raking or sifting anything large enough to be considered the foreign matter, including sticks, stones, litter, and other items. Similar applications include lake beaches and fields for beach volleyball and kindergarten and playing field sandpits. The word "SANDBONI" is a back-formation referencing the ice-surfacing machine Zamboni.

II. LITERATURE REVIEW

Beach litter collection is a concern for Bang Sane beach, one of the popular tourist attractions of Thailand. In order to solve this problem, a beach cleaning trailer was designed and fabricated with emphasis on the use of local materials and local production[1]. The design trailer prototype 3.7x1.6meters was carried out using a three-dimensional solid modeling computer program. This paper explores the economics of the beach-cleaning trailer in terms of payback period, charging rate and working areas. The research provided positive results on economic aspects. The design trailer prototype has been developed and fabricated with emphasis on the use of local materials and local production. The machine has been tested at Bang Saen beach in Thailand. We have explored the economics of the beach-cleaning trailer in terms of payback period, charging rate to customer, working areas. The research provided some positive results on economics aspects. We hope to further design and develop the fully mechanized beach cleaning trailer.

Food Inventory System

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Abstract: The amount of food waste generated in the country is continually increasing, the misuse of food along each stage of the food lifecycle has become a serious environmental, social, and financial issue. Huge sum of food is misused every day in hotels and restaurants. The unused at marriage halls, a party hall etc. is also gigantic. In a country, a huge society is poor of basic amenities and don't get meal for one time, such wastage is intolerable. The proposed method says that if we can connect these two, in such a way that these orphanages can get the "food to be wasted" without hassle, and the hotels, restaurants, party-halls find these food searchers without any extra effort then it will serve a greater source and it will be a big service to human being. Using the new technologies, we can tie the gap. Today's Smartphone's is available at a highly affordable price and is the best way to keep people and agencies connected.

Index Terms **- Sustainability, food waste; social practice, H5. m. Information interfaces and presentation (e.g., HCI): Miscellaneous**

INTRODUCTION:

In the nation where the business status has come to in a phase that huge amounts of accessible palatable nourishment is hurled away as waste in each phase of the showcasing. Nourishment wastage is assessed 25% of the accessible measure of succulent sustenance. The nourishment is imperative vitality requesting item gathering and asset. The counteractive action of sustenance waste should be possible by adding to spare assets to decrease ecological effect amid all phases of advertising framework. No one expects to squander nourishment in the first place, some circumstance in promoting conduct and individual lead to the sustenance squander. Individuals squander eatable sustenance as an achievement suggestive of our populace. Nourishment tossing is a troubling issue all over. The road and refuse containers station have more sustenance as an idea to demonstrate it. The capacities and gathering lobbies of lodgings discharge out so much nourishment. Unified people group development setup is up to 40% nourishment is created is famished.

The legislative issues activity is responsible to penniless individuals confronting confusion in nourishment today. The human advancement and customs are assuming a lead job in show of squandering palatable nourishment. The colossal wedding leading comprises of biggest supper of assortment foodstuff.

Aside from lessening sustenance squander at the source, the most alluring SFM practice is to occupy nourishment squander through nourishment gift to individuals, as creature feed, modern uses, (for example, rendering fats into esteem included materials), or treating the soil. Associations, for example, the Food Waste Reduction Alliance (FWRA), a workgroup with individuals from the Food Marketing Institute, Grocery Manufacturers Association and the National Restaurant Association, expect to decrease the measure of nourishment squander entering landfills by expanding the amount of sustenance gave to those in need and by reusing unavoidable nourishment squander.

Durable or untainted transient nourishments can be given to neighborhood sustenance banks, soup kitchens, wash rooms, and safe houses. Sustenance banks benefactors ordinarily incorporate makers, supermarket chains, nourishment administration substances, eateries, wholesalers, and ranchers.

The succulent nourishment which is squandered could be revamping for human usage. Tossing accessible and consumable waste sustenance can be basically supported by another person and is sheer squanders of assets. shelter fills in as sustenance authorities, gathers nourishment and redistribute dry sustenance and prepared nourishment from giver to network Center (poor individuals). The methodology manages gathering the sustenance squander by shelter and giving to poor individuals (philanthropy homes), thinking about the sorts and wellsprings of nourishment. The methodology bolster shelter to gather surplus nourishment squander from giver and give that sustenance to destitute individuals.

EXISTING SYSTEM:

There is missing of food wastage management system. Hotel, restaurant, party hall, marriage hall distribute extra food with their employees and remaining food is throwaway.

PROPOSE SYSTEM:

In propose system all orphanage, NGOs will be register on government website with respected to their locations. Registration will also contain basic information of all members, by which it will easy to recognize daily need of food quantity. Similar all hotels, caters, event organizers also get register on website. Each hotel, caters will provide their daily fix quantity of food to nearby NGOs and Orphanage to avoid food wastage.

LITERATURE SURVEY:

Soft Approach for Plant Pathology

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Abstract- Agricultural productivity is something on which economy highly depends. This is the one of the reasons that disease detection in plants plays an important role in agriculture field, as having disease in plants are quite natural. If proper care is not taken in this area then it causes serious effects on plants and due to which respective product quality, quantity or productivity is affected. Detection of plant disease through some automatic technique is beneficial as it reduces a large work of monitoring in big farms of crops, and at very early stage itself it detects the symptoms of diseases i.e. when they appear on plant leaves. This paper presents an algorithm for image segmentation technique which is used for automatic detection and classification of plant leaf diseases. It also covers survey on different diseases classification techniques that can be used for plant leaf disease detection. Image segmentation, which is an important aspect for disease detection in plant leaf disease, is done by using Convolutional Neural Network (CNN) algorithm.

Keywords: *Texture,* Diseases and symptoms, *Plant Leaf Disease, Image Segmentation, Image Acquisition, Convolutional Neural Network (CNN)*

I. INTRODUCTION

Botany is the scientific examination of plants characters. Indian economy is highly dependent of agricultural productivity. Therefore in field of agriculture, detection of disease in plants plays an important role. To detect a plant disease in very initial stage, use of automatic disease detection technique is beneficial. Here is the number of plant diseases that occur and affects the normal growth of a plant. These diseases affect complete plant including leaf, stem, fruit, root, and flower. Most of the time when the disease of a plant has not been taken care of, the plant dies or may cause leaves drop, flowers, and fruits drop. Appropriate diagnosis of such diseases is required for accurate identification and treatment of plant diseases. Plant pathology is the study of plant diseases, their causes, procedures for controlling and managing them. But, the existing method encompasses human involvement for classification and identification of diseases. This procedure is time-consuming and costly. Automatic segmentation of diseases from plant leaf images using soft computing approach can be reasonably useful than the existing one.

The computer has a ability to process multimedia information like images captured from some computing devices. An image contains important information that can be retrieved by using some computational method. Image segmentation is a task for partitioning an image into smaller parts that are more meaningful. Interestingly, it can be stated as identification and classification of some region of interest. The segmentation is performed based on some common properties of the objects present in an image like color, texture and, shape etc. Image segmentation is a preprocessing step for image processing generally performed by using two methods (i) Traditional method and (ii) Soft computing method.

Soft computing having the capability to deal with uncertainty has been most widely used for image segmentation nowadays. Soft computing methods are designed to simulate human intelligence by learning from their skills to perform some complex task automatically. The Soft Computing (SC) methods is a group of methods mainly Fuzzy Logic (FL), Neural Network (NN), and Genetic Algorithm (GA) and Bacterial foraging optimization (BFO) etc. Soft computing methods generally do not require human intervention they perform the segmentation task automatically.

II. EXISTING SYSTEM

The existing method for plant disease detection is simply naked eye observation by experts through which identification and detection of plant diseases is done. For doing so, a large team of experts as well as continuous monitoring of plant is required, which costs very

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Enabling authentication and Access Control-Based Data Sharing with personal Information Hiding for Secure Cloud Storage

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Abstract: **To improve the quality of healthcare and individual's quality of life E-healthcare cloud system shown its potential unluckily, privacy and security slow down its general deployment and application there are many researches focusing on preserving the privacy of the electronic healthcare record (EHR) data. However, these works have two main limitations first, they only works on 'black or white' access control policy. Second, they suffer from the inference attack. This paper, for the first time, we design an inference attack-resistant e-healthcare cloud system with fine-grained access control we first propose a two-layer encryption scheme. To make sure an efficient and fine-grained access control over the EHR data, we design the first-layer encryption, where we develop a specialized access policy for each data attribute in the EHR, and encrypt them individually with high efficiency. To preserve the privacy of role attributes and access policies used in the first-layer encryption, we systematically build the second-layer encryption To take full benefit of the cloud server, we propose to let the cloud execute computationally concentrated works on behalf of the data user without knowing any sensitive information To preserve the access pattern of data attributes in the EHR, we additional construct a blind data retrieving protocol. We also show that our scheme can be easily extended to support search functionality. Finally, we conduct extensive security analyses and performance evaluations.**

Keywords: **Advance encryption standards, Personal data Abstraction, Anonymous authentication, rotating group signature, elliptic curve cryptography, smart health applications.**

Introduction:

Cloud Computing provides a based way to the user for storing and computing the data. We can use cloud computing to maintain data privacy and confidentiality in the cloud. We need to pay-per-use and it requires an internet connection for work. Due to lack of data security cloud provides an efficient way to store the data in encrypted form on the cloud. The aim is to prevent misuse of patient's documents and search they require data as per patient requirement. The serious secure and protected concerns are the over the form of problems that stand in the way of wide adoption of the framework. IT application plays an important role in the area of health and patient care. Cloud users upload personal or confidential data to the data center of a Cloud. In previous Electronic Health Record Systems cannot handle dynamic changes related to a number of the user. Our main motive is to protect the data from unauthorized access. In the previous system file uploading operation is not performed securely and misused of data increased because of lack of security. The cloud file might contain some sensitive information and The sensitive information should not be exposed to others when the cloud file is shared and Encrypting the whole shared file can realize the sensitive information hiding In some common cloud storage systems such as the Electronic Health Records (EHRs) system, the cloud file might contain some sensitive information. In the cloud storage services, users can slightly store their data in the cloud and recognize the data sharing with others. Remote data integrity auditing is proposed to guarantee the integrity of the data stored in the cloud. In some common cloud storage systems such as the Electronic Health Records (EHRs) system. In this Project, a sanitizer is used to sanitize or mining the data blocks corresponding to the sensitive information of the file and transforms these data blocks' signatures into valid ones for the sanitized file In remote data integrity auditing schemes, the data owner firstly needs to generate signatures for data blocks before uploading them to the cloud. These signatures are used to prove the cloud truly possesses these data blocks in the phase of integrity auditing.

Related work:

In order to verify the integrity of the data stored in the cloud, many remote data integrity auditing schemes have been proposed. To reduce the computation burden on the user side, a Third Party Auditor (TPA) is introduced to periodically verify the integrity of the cloud data on behalf of user. Ateniese etal. [2] firstly proposed a notion of Provable Data Possession (PDP) to ensure the data possession on the untrusted cloud. In their proposed scheme, homo morphic authenticators and random sampling strategies are used to achieve block less verification and reduce I/O costs. Juels and Kaliski [3] defined a model named as Proof of Retrieve ability (PoR) and proposed a practical scheme. In this scheme, the data stored in the cloud can be retrieved and the integrity of these data can be ensured. Based on pseudorandom function and BLS signature, Shacham and Waters [4] proposed a private remote data integrity auditing scheme and a public remote data integrity auditing scheme. In order to protect the data privacy, Wang et al. [5] proposed a privacy-preserving remote data integrity auditing scheme with the employment of a random masking technique.

DIMENSION REDUCTION FOR EMOTION RECOGNITION USING FACIAL EXPRESSIONS

19-20

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Abstract : Facial expressions and gestures are one of the most important cues for sensing human emotion and intentions among people. As computing becomes more human focussed an automatic system for accurate facial expression analysis is relevant in emerging fields such as interactive games, online education, entertainment, autonomous driving, analysis of viewer reaction to advertisements, etc. For example, the reactions of gamers could be used as feedback to improve the gaming experience on systems. Similarly, analysis of facial expressions of drivers would play an important role in estimating their stress level and such information could be further used to alert drivers well in advance. With these applications in mind, this report describes our attempt to learn facial expressions in real time using deep learning techniques such as convolutional neural network. We also contrast our deep learning approach with conventional "traditional" learning based approaches and show that a convolutional neural network is far more effective at learning representations of facial expression data.

ndexTerms - **Convolutional Neural Network,Open -CV,Haar Cascade,Emotion**

I. INTRODUCTION

Robots have become prevalent in our society with their use spanning a number of domains such as manufacturing, education and health care. Those applied in social environments are autonomous and are typically endowed with cognitive abilities to emulate human reasoning, experiential learning and communication. Their interaction with humans is an extremely important element for in-depth research and careful design.

Since emotions are central to human experience and behavior and prevalent in all forms of communication, it is important for social cognitive robots to be well equipped with all ways of recognizing and understanding human expressions so that the robots will then be able to respond effectively according to the response required. This will allow for natural interactions between humans and robots.

II. LITERATURE SURVEY

1.Facial Emotion Recognition

This report has implemented several learning methods: SVM and DBM, which are all excellent methods in general and the aim was to construct the prediction system which is most suitable to the challenge. The technique used along with SVM and DBM [1] was Fusion method and the database used for the implementation was the Semaine (3000 frames) database. The accuracy achieved here was 88.66%. There were several limitations of this method. However, the major one was that the experiment performance of some Action Units was much lower than that of other because the frame samples were randomly arranged.

2. Feature Selection for Facial Emotion Recognition based on Genetic Algorithm

In this work, a new feature selection technique was introduced for facial emotion recognition system based on Genetic Algorithm and Linear Discriminant Analysis for optimizing the feature selection. It contains feature extraction using Pyramid Histogram of Oriented Gradient, feature selection using GA and feature classification using LDA. The performance of this approach was evaluated using frontal images from RaFD (Radboud Faces Database) (67 Samples) database[3]. Experiments show that this approach is effective in decreasing the number of features and improving the classification accuracy simultaneously. However, one of the major drawbacks of this approach is that GA involves performing multiple. The accuracy achieved here was 97.33%.

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UGC care

RESEARCH ARTICLE

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Criminal Record Management System Using Blockchain Public Ledger

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ABSTRACT

India is experiencing an increase in criminal activity. However, the main problem is that these activities are not effectively recorded and stored. Both manual and digital databases have several flaws. If records are stored in computerized database systems, there are variety of database-based vulnerabilities that exploit a database and can misuse it. Primarily the attacks which are responsible for this damage caused to the computerized databases are SQL Injection, Buffer Overflows, and some human errors like Broken Authentication. On the other hand, in manual databases, information management is a role with growing degrees of risk and accountability. Lawsuits arising from records and data mismanagement are on the rise, and the most common causes include a lack of quality control and planning, backlogs of outstanding records requests, insufficient policy and training, and erroneous crime stats. To make matters worse, some corrupt officials manipulate or delete the records. In addition to these problems, there is mismanagement of the grant money or funds provided by the government for the functioning of these Police Stations. To address all of these issues, we propose a blockchain-based solution. Using the storage module that we propose, we will be able to securely store criminal record data without the risk of alteration by external parties and the vulnerabilities associated with databases. By storing all records in an immutable ledger, we eliminate the possibility of data being altered without our knowledge. Through our Transaction module, the Consensus algorithm will ensure the proper flow of funds.

Keyword: Blockchain, Ethereum, Computer Security, Solidity.

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INTRODUCTION

In 2020, a total of 66.01 lakh Cognizable Crimes were recorded, compared to 51.56 lakh Cognizable Crimes in 2019, a staggering rise of about 14%. [1]. Any claim made verbally or in writing involving violations that must be reported under the law is referred to as a complaint.

Offenses are divided into two categories in the Criminal Procedure Code: cognizable and non-cognizable offences. [2]. Murder, rape, abduction, and other heinous crimes are examples of cognizable offences. The law enforcement officer has the power to make an arrest without the need for a warrant and to initiate an inquiry with or without judicial approval. [3]. Only cognizable offenses are eligible for a First Information Report (FIR). Anyone who has been a victim of the crime or seen it being perpetrated can register a FIR. The FIR is filed with the police station. The FIR contains the following information: The date, time, location, incident facts, and a depiction of the individual(s) involved are all included in a FIR. A charge

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Double Loop Decoupled Proportional Controller for Dynamic and Kinematic Model for a Ground

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ABSTRACT: In this paper the design of proportional controller has been described for tracking the heading angle of vehicle. A linear "Bicycle dynamic model" that takes into accounts the slip angle and ground wheel interaction has been used. The heading angle is same as the steering of front wheel so actuator dynamics was included in this model. The actuator dynamics and vehicle transfer function loops were decoupled to minimise the error and maximise accuracy of the system. Speed of the vehicle was influenced by the change of heading angle due to change in steering angle and velocity of vehicle So in this paper whole system was simulate for different velocity and controller gain. The result of simulation for both the dynamic and kinematic model with actuator dynamics and without actuator dynamics has been compared by using Matlab-simulink. Mathematical expression for the vehicle and actuator dynamics has been explained clearly. From the result of simulation it is found that the desired heading angle of 20 degree can be achieved in 2 seconds while the speed of vehicle is 4m/sec by tuning the controller effectively. A realistic mathematical model of the vehicle considering cornering stiffness was calculated by Hewson's method.

Keywords: Vehicle heading angle, proportional controller, kinematic model, dynamic model, cornering stiffness.

NOMENCLATURE

m : mass of the vehicle
Iz : yaw moment of inertia of the vehicle
δ : steering angle of the front wheel
r : yaw rate of the vehicle
θ : vehicle yaw angle measured with respect to theinertial global X-axis
v : velocity of the vehicle
Fyf : lateral tire force on the front wheel
Fyr : lateral tire force on the rear wheel
l : wheelbase
lf : distance of front tire from vehicle CG
lr : distance of rear tire from vehicle CG
Cf : cornering stiffness of the front wheel
Cr : cornering stiffness of the rear wheel

I. INTRODUCTION

An eloquent task in designing a controller for a ground vehicle is a challenge. In this paper the heading angle is controlled by a proportional controller with K_p 0.08 with 2% of overshoot. The dawn of motor vehicle age occurred around 1769 when the French military engineer, Nicholas Joseph (1725-1804), built a wheel wheeled stream driver vehicle for the purpose of pulling artillery pieces [1, 2]. With higher speed the vehicle dynamics of the vehicle particularly turning and braking assumed greater importance as an engineering concern. A car with "over steering" the driver's hand pushes towards greater steer angle [3]. This paper focused on rubber tire vehicle. The vehicle motion accomplished in accelerating, braking (deceleration), cornering and ride is a response of force imposed.

On March 13, 2004 a gaggle of engineers congregated outside a California dive bar to watch 15 self driving cars in the first ever DARPA (Defence Advance Research Project Agency) grand challenge. The first big push towards an fully autonomous vehicle. It bridges the gap between fundamental discourtesies and military uses. All the self driven vehicle was need to cross the 250 km (150 miles) in a limited time. No vehicle able to finished, in fact no vehicle able to finish 150km (7.3 miles) most vehicle died all together. Carnegie Mallon University's self driving vehicle "Sandstorm" travelled the farthest distance, completed 11.78 km (7.32 miles), it used pursuit algorithm based on geometric method of path follow. On October 28, 2005 second DARPA grand challenge was scheduled 23 self driven vehicles surpassed the 11.78 km distance completed by the best vehicle in 2004. Stanley vehicle completed the challenge in 6h: 54 min; vehicle passed through 3 narrow tunnels and negotiated more than 100 sharp left and right turns. This vehicle used a steering control law based on kinematic bicycle model. In 27 DARPA urban challenges "Boss" own the challenge in less than 5 hour to complete the 96 km urban race-course used predictive control strategy.

This leads automotive dynamics engross the study of how and why the forces are generated. The ascendant forces acting on the system to control process are generated by the tire against the road. Understanding the vehicle dynamic can accomplished by the two levels, that is the empirical and analytical. The empirical understanding derives from trial and error method. This sometimes led to failure at some other value of controller gain. It might be noted analytical method also are not foolproof because they usually only approximate reality. In this study considering the mathematical modelling and system identification to determine the vehicle dynamic in section III.

The vehicle is consisting of many components arranged in its exterior envelope. For example when brake the vehicle slow down so it can be presented as one lumped mass located at its centre of gravity (CG) with appropriate mass and inertia property.

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Dermatological Disorder Detection Using Machine Learning

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Abstract:- Skin diseases are considered one of the biggest scientific troubles in 21st century because of its especially complex and luxurious prognosis with problems and subjectivity of human interpretation. In cases of deadly illnesses like Melanoma prognosis in early tiers play a critical part in determining the possibility of getting cured. The software of automated strategies will assist in early diagnosis specifically with photographs with riety of analysis. Hence, in this system we present a completely automated machine of skin sickness recognition via lesion images, a device intervention in evaluation to traditional clinical personnel based detection. This system is designed into 3 levels compromising of statistics series and augmentation, designing version and subsequently prediction of disease. This proposed system uses more than one AI algorithms like Convolutional Neural Network and naive Bayes classifier and amalgamated it with image processing tools to shape a higher shape, leading to better accuracy.

Keywords:- *Convolutional Neural Network, Naive Bayes classifier, Dermatological Disorders, Machine Learning.*

I. INTRODUCTION

THE proposed system is for the detection of human pores and skin sicknesses primarily based on image processing. Detection of disorder consists of strategies hich include acquisition of skin samples, pre-processing of samples, segmentation of images, and extraction of functions. The proposed system makes use of Convolutional neural network and Naive Bayes classifier to discover the tactics used to pick out human skin diseases. This system additionally addressed several strategies of segmentation and extraction of capabilities used with extra accuracy in the identity of human pores and skin ailment. The current research for the diagnosis of human skin disease is entirely based on machine learning and neural network through which human skin disease identification and detection is conducted. For better accuracy and high reliability, the need for human skin dataset reaches in size. On the basis of machine learning and image processing, system developing human skin disease detection and prediction technology. The system will work on the limited size of the image dataset of the human skin downloaded from isic Archive. The system use Convolutional neural network to achieve high detection accuracy. Also use Naive Bayes classifier for performance evaluation. The proposed technique is used to classify and identify the various skin diseases that infect human skin. A recognition system based on machine learning should prove to be very beneficial in improving the accuracy in current work. The image processing methods are the approach given in this for extraction of the skin feature. Convolutional neural networks are to be used for automated detection of diseases in skin. The proposed method can be impactful and effective for skin disease detection, and it appears to be an important approach. This system acquires various images of skin for extraction of features. The analysis phase, pre-processing unit is used to remove noise, to convert gray scale using Gaussian filter, to convert binary images. Convolutional Neural Network (CNN) will be used in our system for disease prediction where we have the input unit of skin images training data set. Next have a hidden layer that acts on this training dataset to evaluate the results train model of the output unit. This whole CNN works by taking into account the elements, namely the matrix feature of images, for designing a train model for recognition of skin disease. When dealing with real-time skin disease detection, will face limitations that will not produce results with higher accuracy. In the future, to solve this constraint, must work with real-time skin disease data collection.

II. REVIEW OF LITERATURE

Hassan Yasser et. al [1] stated that human pores and skin coloration has been studied as biometric indicator, most of preceding researches studies centered in the use of skin color to locate the face, human and human movement. Goal of this article is to assess a version in human skin shade as completely unique code for identity reason. Fifty picture of the nostril were captured the usage of a cell digital camera with a decision of three mega pixel. Area of the nose location has been the region of interest to symbolize a place of less direct publicity to the solar light as the relaxation of a face. The color pics had been transformed from RGB to HSI layout in an effort to isolate the impact of the mild. Intensity in the course of shots. The snap shots had been analyzed using mathematical and statistical methods (Mean, Median, wellknown deviation, kurtosis, skewness, and gray level co-prevalence matrices (GLCM).

Satishkumar L Varma et. al [2] states that human skin detection coloration is crucial in numerous programs. There are various pores and skin primarily based packages in several areas namely gesture evaluation, face reputation, character tracking, and nudity detection, pornography filtering, website filtering, content based picture retrieval. Skin detection includes looking of pores and skin colored

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IoT Trash Bin

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Abstract- ***Waste management is one of the primary problems that any country faces. The main issue in the waste management is that the garbage bin gets over- flowed before the beginning of the next cleaning process. Overflowed garbage bins are creating bad smell and making an unhygienic environment. And due to this situation number of diseases taking lives of people because of bacteria and viruses spreading rapidly. . For better health and environment OUR system proposes alert system for emptying the dustbin by sending a message to the municipal web server based on garbage level. Whole system is based on IoT. The system uses ultrasonic sensor, infrared sensor, air quality sensor, NodeMcu , GPS, LED, and servo motor. Also, system uses blynk framework. This system will allow the authorized people to manage cleaning of dustbin through IoT.***

Indexed Terms- ***NodeMCU, GPS, LED, IoT, Garbage Collection***

I. INTRODUCTION

Garbage consists of the unwanted materials left over from city, urban areas, Educational Institutions, Business organizations, home etc. This project will help to understand the ecosystem and in the developments of research on IOT to eradicate or minimize the garbage disposal problem. IOT is a recent communication Technology, in which the objects of everyday life will be equipped with BLYNK Server, transceivers for digital communication and suitable protocol stacks, that will make them ready to communicate with each other and with the users.

II. LITURATURE SURVEY

[1] In, once the truck comes on the brink of the rubbish bin,RFID starts act of sending the knowledge .Ultrasonic sensors measure level of waste, buzzer to alert the truck regarding proportion of garbage level and L.C.D displays the share level. GPS is employed for sleuthing the location of the bin. During this project the rubbish bins square measure set within the urban areas of a town and an circuit camera is mounted on the bin location.

[2] Device is formed which could relay its information, that is, level of garbage bin to the concerned person due to which route for the truck collecting garbage is optimized. Garbage bins that area unit crammed quite seventieth area unit empty 1st. Optimized route is chosen by the algorithmic rule that saves time and price and raises a step towards clean town.

[3] during a wise system is formed that alerts internet server of municipality once garbage within the bin is higher than threshold worth and needs to be cleared inside given time. One who empties the bin confirms that he has completed the task. Real time status of the bin is usually monitored with the assistance of this method that's integrated with RFID tag, Wi-Fi module, and ultrasonic sensing element.

[4] the most aim of the recycle system planned in is to change assortment of points for playacting a disposal activity into designate recycle bins. Such system encourages utilization activities by permitting the points to be re- deemable for merchandise or services. This feature is to assist makers in managing the acquisition of useful merchandise. The system permits convenient recording of data related to the disposal activities, disposed material, identification of the user and points collected by the user. Recycle Bin that caters for utilization glass (brown), paper (blue) and metal will, plastic merchandise (orange) that mechanically judge the worth of the wastes thrown consequently and supply 3R(Reduce, Recycle, Reuse) card.

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Garbage Monitoring System

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Abstract- ***With the development of urban communities, the waste delivered likewise increments. Squander the board is one of the essential issue that the world faces regardless of the instance of created or creating nation. The key issue in the waste administration is that the trash canister at open spots gets flooded well ahead of time before the initiation of the following cleaning process. Flooded trash containers are making an unpalatable smell and making an unhygienic situation. Furthermore, this is prompting the fast development of microscopic organisms and infections which are causing various kinds of sicknesses.***

To beat these circumstances productive trash assortment frameworks are getting created dependent on IoT. Different structures have just been proposed and have preferences just as burdens.

Indexed Terms- ***NodeMCU, GPS, LED, IoT, Garbage Collection***

I. INTRODUCTION

Garbage consists of the unwanted materials left over from city, urban areas, Educational Institutions, Business organizations, home etc. This project will help to understand the ecosystem and in the developments of research on IOT to eradicate or minimize the garbage disposal problem. IOT is a recent communication Technology, in which the objects of everyday life will be equipped with Arduino family microcontrollers, transceivers for digital communication and suitable protocol stacks, that will make them ready to communicate with each other and with the users.

II. LITERATURE SURVEY

[1] In, once the truck comes close to the rubbish bin, RFID starts act of sending the information. Ultrasonic sensors measure level of waste, buzzer to alert the truck regarding proportion of garbage level and L.C.D displays the share level. GPS is employed for sleuthing the placement of the bin. During this project the rubbish bins square measure set within the urban areas of a town and an electrical circuit camera is mounted on the bin location.

[2] Device is made which might relay its information, that is, level of garbage bin to the concerned person due to which route for the truck collecting garbage is optimized. Garbage bins that square measure crammed quite seventieth square measure empty 1st. Optimized route is chosen by the algorithmic rule that saves time and price and raises a step towards clean town.

[3] In a wise system is made that alerts the net server of municipality once garbage within the bin is higher than threshold worth and wishes to be cleared inside given time. One who empties the bin confirms that he has completed the task. Real time status of the bin is often monitored with the assistance of this method that is integrated with RFID tag, Wi-Fi module, and ultrasonic sensing element.

[4] The main aim of the recycle system planned in is to change assortment of points for playacting a disposal activity into designate recycle bins. Such system encourages utilization activities by permitting the points to be re- deemable for merchandise or services. This feature is to help makers in managing the acquisition of useful merchandise. The system permits convenient recording of knowledge associated with the disposal activities, disposed material, identification of the user and points collected by the user. Recycle Bin that caters for utilization glass (brown), paper (blue) and metal will, plastic merchandise (orange) that mechanically judge the worth of the wastes thrown consequently and supply 3R(Reduce, Recycle, Reuse) card.

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Dermatological Disorder Detection Through Machine Learning

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Abstract- Dermatological Diseases are considered one of the biggest scientific troubles in 21st century because of its especially complex and luxurious prognosis with problems and subjectivity of human interpretation. In cases of deadly illnesses like Melanoma prognosis in early tiers play a critical role in determining the possibility of getting cured. The software of automated strategies will assist in early diagnosis specifically with the set of photographs with variety of analysis. Hence, in this text we present a completely automated machine of dermatological sickness recognition via lesion images, a device intervention in evaluation to traditional clinical personnel based detection. Our model is designed into 3 levels compromising of statistics series and augmentation, designing version and subsequently prediction. This proposed system used more than one AI algorithms like Convolutional Neural Network and naive Bayes classifier and amalgamated it with image processing tools to shape a higher shape, leading to better accuracy.

Index Terms- Convolutional Neural Network, naive Bayes classifier, Dermatological Disorders; Machine Learning.

I. INTRODUCTION

The proposed work is for the detection of human pores and skin sicknesses primarily based on image processing. Detection of disorder consists of strategies which include acquisition of skin samples, pre-processing of samples, segmentation of images, and extraction of functions. The proposed system makes use of Convolutional neural network and Naive Bayes classifier to discover the tactics used to pick out human skin diseases. This system additionally addressed several strategies of segmentation and extraction of capabilities used with extra accuracy in the identity of human pores and skin ailment. The current research for the diagnosis of human skin disease is entirely based on machine learning and neural network through which human skin disease identification and detection is conducted. For better accuracy and high reliability, the need for human skin dataset reaches in size. On the basis of machine learning and image processing, system developing human skin disease detection and prediction technology. The system will work on the limited size of the image dataset of the human skin downloaded from isic Archive. The system use Convolutional neural network to achieve high detection accuracy.

Also use Naive Bayes classifier for performance evaluation. The proposed technique is used to classify and identify the various skin diseases that infect human skin. A recognition system based on machine learning should prove to be very beneficial in improving the accuracy in current work. The image processing methods are the approach given in this for extraction of the skin feature. Convolutional neural networks are to be used for automated detection of diseases in skin. The proposed method can be impactful and effective for skin disease detection, and it appears to be an important approach. This system acquires various images of skin for extraction of features. The analysis phase, pre-processing unit is used to remove noise, to convert gray scale using Gaussian filter, to convert binary images. Use the OTSU method followed by extraction of the feature. Convolutional Neural Network (CNN) will be used in our system for future recognition where we have the input unit of skin images training data set. Next have a hidden unit that acts on this training dataset to evaluate the results train model of the output unit. This whole CNN works by taking into account the factors, namely the matrix feature of images, for designing a train model for recognition of skin disease. When dealing with real-time skin disease detection, will face limitations that will not produce accurate results. In the future, to solve this constraint, must work with real-time skin disease data collection.

II. REVIEW OF LITERATURE

Hassan Yasser et. al [1] stated that human pores and skin coloration has been studied as biometric indicator, most of preceding researches studies centered in the use of skin color to locate the face, human and human movement. The goal of this article is to assess the version in human skin shade as a completely unique code for identity reason. Fifty picture of the nostril were captured the usage of a cell digital camera with a decision of three mega pixel. Part of the nose location has been the region of interest to symbolize a place of less direct publicity to the solar light as the relaxation of the face. The color pics had been transformed from RGB to HSI layout in an effort to isolate the impact of the mild. Intensity in the course of shots. The snap shots had been analyzed using mathematical and statistical methods (Mean, Median, wellknown deviation, kurtosis, skewness, and gray level co-prevalence matrices (GLCM).

Satishkumar L Varma et. al [2] states that detection of human skin coloration is crucial in numerous programs. There are

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Typographic Portrait Generator using Image Processing

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Abstract: ***Typography portrait is a portrait is a portrait made up of words. The face of a person has different shades and distinct features. In order to make a typography portrait the distinct shades and features need to be clearly extracted. Existing systems focus only on the different shades of the face. They fill the face with word clouds without any regard for the distinct features of a face. This project will consider not only the shades of a face but also the features of a person's face. The extraction of facial features will be done first and then text filling will be done accordingly. This project intends to create an application that will create a typography portrait having a much better visual appeal than the present systems.***
Keywords: Image Processing, Edge Detection, Image Segmentation, Face Recognition, Text Orientation, Text Elongation.

I. INTRODUCTION

Typography is the art and technique of arranging text to make written language appealing when displayed. The arrangement of type involves selecting typefaces, point sizes, line lengths, line-spacing, and letter-spacing (tracking), and adjusting the space between pairs of letters. The term typography is also applied to the style, arrangement, and appearance of the letters, numbers, and symbols created by the process. Typography is the work of typographers, graphic designers, art directors, manga artists, comic book artists, graffiti artists, and, now, anyone who arranges words, letters, numbers, and symbols for publication, display, or distribution. Until the Digital Age, typography was a specialized occupation. Digitization opened up typography to new generations of previously unrelated designers and lay users. A picture is worth a thousand words. But what's a picture of words worth? In the hands of some, far more still. Typographic Portraits combine the specifics of an image with the communicative power of words. They can capture an idea, or express the essence of a person's state of being, in a way that is hard to match in terms of interest and visual appeal. The images in this gallery are sometimes happy, sometimes sad. Colorful, or bleak. But all express themselves in a way unique to typographic portraits.

II. LITERATURESURVEY

The modified approaches using various exploring techniques, the research papers for implementation of idea of project is done. The study related to image processing and text wrapping used in various models and the comprehensive literature review of various researcher's works are stated here.

A. A novel framework for synthesizing the stylization of text-based images. It is composed of several steps without supervision. Initially, the style image is segmented to foreground and background images. Then, the main color of foreground is accumulated and assigned to the stroke-based binarized geometric shape like text, symbols and icons to be content image. The foreground image is considered as the target style and transferred to the content image by image style transfer neural network.Finally, the composition of the stylized geometric shape and the complete background image is accomplished by texture synthesis.The experimental results were (a)Comparison of style transfer method, (b)Improved neural style transfer model, (c)Image inpainting. In the last synthesized image, the style of the font will be more prominent, so that the coordination of the entire image will not be affected. Background subtraction was required for further procedure and also in acquiring accuracy.

B. Background subtraction technique is discussed which will eventually help in separating the person in the image for portrait generation. Selective background subtraction is the major problem associated with background subtraction technique. For foreground detection, background modeling is used in many different applications to subtract the background and detect foreground object in the image. There are many challenges in elaborating a good background subtraction algorithm and researcher have been appropriated to developing the new innovation and enhancement techniques to overcome all the limitations. Grayscale and HSV images are used in background subtraction. It does not show robustness at times. Accuracy is sometimes not obtained.

IOT Powered Wearable to Assist Individuals: Survey

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Abstract: ***Depression is a common and crucial public health concern in India expanding at a very fast pace. It is affecting people of all age groups, male or female, urban or rural, educated or uneducated and even employed or unemployed. In India, a large number of people are committing suicides due to depression each year. With the advancement of technology, sensors become an extensive part of everyday life. Various researchers are trying to detect and treat depression with the use of sensors, IOT and other technology. Heartbeat sensor is used, which monitors heartbeat rate. In this paper, we are inspecting multiple ways in which the researchers are trying to help people by detecting depression.***

Keywords: **Internet of Things, Depressive Disorders, Depression detection, Real life, Wrist device, wearable sensors, Machine learning.**

I. INTRODUCTION

Daily life depression is an important problem of our modern society. It is a growing issue and it has become an unavoidable part of our daily lives. Depression is the unwavering feeling of sadness, exhaustion and anxiety along with various physical complaints. Depression is a non-communicable disease and can be cured with the correct dosage of medicines and sometimes lifestyle changes.

Internet of Medical Things (IoMT) is becoming a common paradigm with so many advancements in the medical industry. This has increased the life expectancy of people especially in the developed countries [10]. The Internet of Health Things [11] or Internet of Medical Things [12] or Smart Healthcare [13] as it being called is combining the reliability and safety of conventional medical devices used for the treatment of chronic illnesses with the dynamicity and generality of Internet of Things. IoMT is providing solutions for addressing the requirements of both the ageing population as well as patients with chronic diseases and providing patients mobility in contrast to the telemedicine systems.

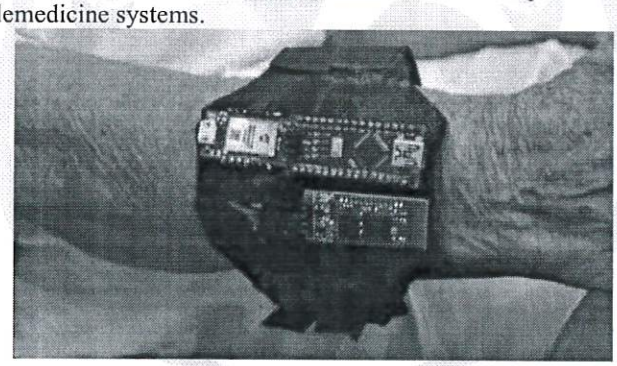

Figure: - IOT Wearable Health Band

The paper is structured into four sections. Section I contains entire introduction of what is depression? And how the depression is detected. Section II provides the technological advancements executed by various researchers in detecting depression or treating it. The major works have been depicted in this section. Section III provides the overall architecture of the proposed system along with the detailed description of the sensors used in the proposed system. The conclusion of the survey has been summarized in Section IV.

II. LITERATURE REVIEW

In the period 2005–2016, various studies were conducted to implement depression detection using a combination of signal processing and machine learning (ML). Most of them used data from a sensors like[1,2,3], ECG sensor[1,2,3], heart rate(HR) sensor[4], acceleration (ACC) sensor[5,6], electro dermal activity (EDA) sensor[1,2,3,4,5], blood volume pulse (BVP)sensor and electromyogram (EMG) sensor[2,8]. Some are more constrained, either physically (e.g., brain activity analysis [9]) or with respect to privacy.

To check the driver's Heartbeat rate constantly

To monitor heartbeat rate of driver heartbeat sensor will be attached in Seat belt of the car. Once the driver starts the vehicle and wears the seat belt, this sensor automatically monitors the heartbeat rate of the driver through Internet of Things. When the heartbeat rate goes abnormal (i.e., above the reference value), IOT notifies the emergency message to the owner of the car, nearby Ambulance

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Ensemble of Rule Learner and Sequential Minimum Optimization Algorithm for Intrusion Detection System

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Abstract: ***An intrusion detection system is a process which automates analyzing activities in network or a computer system. It is used to detect nasty code, hateful activities, intruders and uninvited communications over the Internet. The general intrusion detection system is struggling with some problems like false positive rate, false negative rate, low classification accuracy and slow speed. Now-a-days, this has turned an attention of many researchers to handle these issues. Recently, ensemble of different base classifier is widely used to implement intrusion detection system. In ensemble method of machine learning, the proper selection of base classifier is a challenging task. In this paper, machine learning ensemble have designed and implemented for the intrusion detection system. The ensemble of Partial Decision Tree and Sequential Minimum optimization algorithm to train support vector machine have used for intrusion detection system. Partial Decision Tree rule learner is simplicity and it generates rules fast. Sequential Minimum optimization algorithm is easy to use and is better scaling with training set size with less computational time. Due to these advantages of both classifiers, they jointly used with different methods of ensemble. We make use of all types of methods of ensemble. The performances of base classifiers have evaluated in term of false positive, accuracy and true positive. Performance results display that proposed majority voting method of ensemble using Partial Decision Tree rule learner and Sequential Minimum optimization algorithm based Support Vector Machine offers highest classification among different ensemble classifiers on training dataset. This method of ensemble exhibits highest true positive and lowest false positive rates. It is also observed that stacking of both PART and SMO exhibits lowest and same classification accuracy on test dataset.***

Keywords: ***AdaBoost, Bagging, Combination rule, PART, SMO, True positive and False positive***

I. INTRODUCTION

Intrusion detection system is powerful tool which play vital role in protecting the computers and networks. It is used to analyse activities in network or computer for signs of possible results, which are abuse or incomplete threats of abuse of computer security policies, standard security practices or acceptable user policies. It detects malicious code, malicious activities, intruders and unwanted communications over the Internet. Thus, intrusion detection systems have state-of-the-art detection approaches. They are used exclusively in monitoring, analysing, alerting, archiving and reporting. It plays a vigorous role in protecting the modern networks and computers. However; an intrusion detection technology is still immature. Despite the advancements and substantial research efforts, the general intrusion detection system is struggling with some problems like false positive rate, false negative rate, low classification accuracy, slow speed and volumes. Now-a-days, soft computing techniques, data mining and machine learning algorithms are mostly used in intrusion detection field. This technique has the capability of adaptable information processing for conduct real-life vague circumstances [1]. Specifically, Fuzzy Set and Fuzzy Logic, Artificial Neural Network, Evolutionary Programming and Particle Swarm Optimization techniques are being used to implement intrusion detection system. Researchers have used Support Vector Machines, Radial Basis Function, Linear Discriminant Analysis, Classification and Regression Tree (CART) and Iterative Dichotomise 3 (ID3) for intrusion detection. Rule learner are used to such as RIDOR (Ripple down Rule learner), PART and association rule learning have also used in intrusion detection. For reduction of bias and variance on different training dataset, ensemble of base classifiers is used. This method is also called as hybrid classification. The combination of multiple weak learning algorithms or weak learners is called ensemble [2] [3]. In ensemble, multiple weak classifiers are independently trained and then their predictions are combined in some way to make the overall prediction. This method of combination of base classifiers is a very great and very popular. The ensemble classifiers can be centered on either supervised or unsupervised learning techniques [4] [5]. The ensemble of analogous or dissimilar classifiers can reduce the bias and variance on the different training data set. Lastly, ensemble can also be used to combine two different machine learning classifier using Bagging, Boosting, AdaBoost, Stacking (blending) and voting techniques of ensemble. Providing the strong security mechanism is a great challenge in the field of computer and network security. Intrusion detection system is a very important security mechanism to protect computers and networks. To design and implement a successful mechanism for intrusion detection system, there is a need of selection of appropriate technique, method of intrusion detection system, and relevant features in training data set.

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Classification and Prediction of traffic in Optical Burst Switched Networks using Machine Learning

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Abstract

Optical burst switched (OBS) networks has been emerged as a new infrastructure of this century for optical internet. The classification of network traffic and segregation of normal traffic from the malicious traffic is vital for security and data integrity in OBS. The traffic classification mechanism should be dynamic and capable enough to segregate the network traffic in a quick manner, so that the malicious traffic is identified, then deflected at the early stage and the normal traffic is to be channelized to the destined nodes. In this paper, we are presenting two phased machine learning based mechanism. The first phase focuses on the segregation of network traffic into four different classes which assist in reducing the congestion over channels, enhancing the network throughput and providing secure services to end users. The second phase is providing insights into the prediction of traffic load using convolutional neural networks for channelization of the normal traffic over under-utilized and least loaded channels.

Keywords: *Optical Burst Switched Networks, Convolutional Neural Network, Congestion, Machine Learning.*

1. Introduction

In recent years, the demand for network bandwidth has increased at a rapid rate. It is considered to be a major challenge for high-speed networks due to increase in user Apps and popularity of Internet. The efforts are being made worldwide to provide network bandwidth of high capacities to the users at a minimum cost. Optical data communication has offered optimum solution to suffice the demand of users by providing high bandwidth and by supporting various network services [1], [2]. OBS is a new technique that attempts to resolve the problem of allocation of computational resources for bursty internet traffic [3]. OBS offers combine features of the fine grained packet switching and coarse grained circuit switching paradigms. OBS handles bursty traffic efficiently generated by the networks.

An OBS switch is made of optical and electronic components which include multiplexers, de-multiplexers, an optical switching network, an input module, an output module; a control burst router and a scheduler. OBS uses two planes: the control plane and the data plane. Data packets are clubbed into larger bursts before transmitting over the network. The control burst requests for allocation of resources at each switch. The data burst is sent on a separate wavelength. At each intermediate node, the control burst is processed electronically. The time taken for processing a control burst is called as processing time. The control burst then reserves bandwidth on an outgoing channel for the upcoming data burst. The reservation period is the period between the arrival of the data burst and the completion of the data burst transmission. The usage of OBS communication technology has resulted into many critical issues such as traffic load

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Disturbance Observer Based Speed Control of PMSM Using Fractional Order PI Controller

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Abstract—**In this paper, fractional order PI (FOPI) control is developed for speed control of permanent magnet synchronous motor (PMSM). Designing the parameters for FOPI controller is a challenging task, especially for nonlinear systems like PMSM. All three PI controllers in the conventional vector controlled speed drive are replaced by FOPI controllers. Design of these FOPI controllers is based on the locally linearized model of PMSM around an operating point. This operating point changes with the load torque. The novelty of the work reported here is in use of Non Linear Disturbance Observer (NLDO) to estimate load torque to obtain this new operating point. All three FOPI controllers are then designed adaptively using this new operating point. The scheme is tested on simulation using MATLAB/SIMULINK and results are presented.**

Index Terms—**Fractional order PI (FOPI), non linear disturbance observer (NLDO), permanent magnet synchronous motor (PMSM), vector control.**

I. Introduction

CONTROL of non linear systems is always a challenging proposition. One approach of designing a controller for such systems is to linearize a model of nonlinear system around an operating point and design a controller for this linearized model. In this approach, controller design works properly for a particular operating range only. If operating point is changed, the controller is required to be redesigned which becomes complex when operating point changes frequently. In this paper, we provide a solution to this problem by determining operating point dynamically using disturbance observer. The plant considered here is permanent magnet synchronous motor (PMSM), which is basically a nonlinear system. The conventional speed control scheme used for PMSM is vector control where constant torque angle, $\delta = 90°$ is obtained by zero direct axis current. This requires three PI controllers, one for direct axis current with the reference $i_d = 0$, another for quadrature axis current and the third for the speed with the reference ω^*. In our earlier work [1], [2] all these three PI controllers are replaced by fractional order pI (FOPI)controllers. The design of FOPI controllers is based on a linearized model of PMSM. The linearized model is obtained using small signal equations. Design of FOPI controller was presented around a fixed operating point. Simulation results show that the performance of PMSM is improved with the fractional-order controller.

However, if operating point changes, the FOPI parameters need to be redesigned. The idea presented here is to use disturbance observer to find this operating point and design the parameters adaptively. A similar work has been carried out in [3] wherein a linear state feedback controller is designed around an operating point $(I_{qs0}, I_{ds0}, \omega_{s0})$ using Jacobian linearization as discussed in [4]. In this system, load torque appears as a disturbance. The torque developed by the motor is proportional to I_{qs0}. The load torque disturbance is estimated using non-linear disturbance observer (NLDO). At steady state, we assume that the torque developed by the motor is equal to load torque resulting into a new operating point $(I_{qso} = i_q^*)$. Remaining two quantities $(I_{dso} = i_d^* = 0, \omega_{s0} = \omega^*)$ being constant, the operating point can be refreshed by estimation of load torque disturbance.

Various disturbance observers are used for estimating disturbances in non linear systems. Non linear disturbance observer (NDOBC) based on [5], [6] and [7] gives satisfactory estimation of slow varying disturbance. Comprehensive survey of different disturbance observer based control methods is presented in [8]. The performance and convergence of disturbance observer are discussed in [9], [10]. Disturbance observer along with modified sliding mode controller is used for systems with mismatched disturbance [11], [12]. Fractional order disturbance observer (FO-DOB) with fractional Q filter is proposed for vibration suppression in servo control application [13]. Fractional order Q filter along with FO-DOB is designed in this paper. Disturbance is estimated using extended state observer for fractional order LTI system in [14]. The paper proposes fractional order DOB for estimation of a general class of disturbance. Active disturbance rejection controller (ADRC) is used for disturbance estimation of PMSM in [15], [16]. ESO is used for disturbance estimation of PMSM and disturbance rejection technique is used for speed controller in PMSM [17]. In [18] NDOBC is used for PMSM drive system with mismatched uncertainty. FOPI with set point pre-filter are used for electric drives specially PMSM [19].

Fractional Order control is the state-of-the art control. This control gives better performance in comparison with conventional integer-order control. Basic theory and various exercises on fractional-order control are well explained in [20]−[22]. Fractional-order PID control is widely used for position and speed control in servo systems [23]. Fractional

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order PID is designed for position control of magnetic Levitation in [24]. Fractional-order PID controllers along with their control quality enhancement are proposed in [25], [26]. Various tuning methods are proposed in [27]. Design of fractional-order PI using intersection method for linearized model is well explained in [28], [29].

FOPI controllers designed in [1], work around an operating point determined by load torque. Each FOPI controller has three parameters namely K_p, K_i and λ resulting in nine parameters for three FOPI controllers. If operating point is changed, FOPI controller is required to be redesigned.

Compared to the work reported in [1]–[3], the main contribution of this paper lies in determining the change of operating point using NLDO and designing all these parameters for the three FOPI controllers online. Since all three FOPI controllers are tuned online in this algorithm, it is complex. The algorithm proposed in this paper obtains continuous updates of the operating point and refreshes the FOPI parameters in run time. Due to this response of speed is expected to be better in terms of peak overshoot and settling time.

Paper is organized as follows, Section II gives a mathematical model of PMSM (non linear as well as linear) and vector control of PMSM. Section III deals with the design of proposed FOPI algorithm. NLDO is discussed in Section IV. Section V discusses simulation results. Section VI is a conclusion.

II. PMSM Model and Vector Control

Contents in this section are from [2] which are reproduced here for ready reference.

The vector control of PMSM is shown in Fig. 1. In this Fig., three loops for q-axis, d-axis and the speed are clearly shown. In order to develop the mathematical model of PMSM motor, variables from three-phase stator reference frame are transformed into two-phase rotor reference frame. The rotor flux linkages are on the d-axis of the machine. Also, it is assumed that the inductance is independent of the rotor position.

The generalized non-linear mathematical model of PMSM motor in rotor reference frame is [4], and given in (1),

$$\begin{aligned} v_q &= (R_s + L_q p) i_q + \omega_r L_d i_d + \omega_r \lambda_{af} \\ v_d &= (R_s + L_d p) i_d - \omega_r L_q i_q \\ \frac{d}{dt}\omega_m &= \frac{1}{J}(T_e - T_L - B\omega_m) \\ T_e &= \frac{3}{2}\cdot\frac{P}{2} i_q(\lambda_{af} + (L_d - L_q) i_d). \end{aligned} \tag{1}$$

where

1) p is the differential operator, d/dt.
2) v_q and v_d are the voltages in the q-axe and d-axe windings, V.
3) i_q and i_d are the q-axe and d-axe currents, A.
4) R_s is stator resistance per phase, Ohm.
5) λ_{af} is armature flux linkages due to rotor magnets, V·s.
6) L_q and L_d are quadrature and direct axis stator self-inductances in rotor reference frames, H.
7) T_e is the electromagnetic torque, N·m.
8) T_L is the Load Torque, N·m.
9) ω_r is electrical rotor speed, rad/s.
10) ω_m is mechanical rotor speed, rad/s

For designing controller, we linearize the non linear model described in (1) using Jacobian linearization around an operating point using perturbation techniques, which is popularly known as small signal model in electrical drives. This theory is explained in detail in [1]. This model is obtained in rotor reference frame since the currents i_q and i_d are dc quantities. The small-signal equations are as follows:

$$\begin{aligned} \delta v_q &= (R_s + L_q p)\delta i_q + \omega_{s0} L_d \delta i_d + (L_d I_{ds0} + \lambda_{af})\delta\omega_r \\ \delta v_d &= (R_s + L_d p)\delta i_d - \omega_{s0} L_q \delta i_q - L_q I_{qs0}\delta\omega_r \\ Jp\delta\omega_r + B\delta\omega_r &= \frac{P}{2}(\delta T_e - \delta T_L) \\ \delta T_e &= \frac{3}{2}\frac{P}{2}(\lambda_{af}\delta i_q + (L_d - L_q)(I_{ds0}\delta i_q + I_{qs0}\delta i_d)). \end{aligned} \tag{2}$$

Representing these equations in state-space equations we get

$$\dot{X} = AX + BU$$

where

$$\begin{aligned} X &= [\delta i_q \;\; \delta i_d \;\; \delta\omega_r]^T \\ U &= [\delta v_q \;\; \delta v_d \;\; \delta T_L]^T \\ A &= \begin{bmatrix} a_{11} & a_{12} & a_{13} \\ a_{21} & a_{22} & a_{23} \\ a_{31} & a_{32} & a_{33} \end{bmatrix} \\ B &= \begin{bmatrix} \frac{1}{L_q} & 0 & 0 \\ 0 & \frac{1}{L_d} & 0 \\ 0 & 0 & -\frac{P}{2J} \end{bmatrix} \end{aligned}$$

where

$$\begin{aligned} a_{11} &= -\frac{R_s}{L_q}, \;\; a_{12} = -\frac{L_d}{L_q}\omega_{s0}, \;\; a_{13} = -\frac{(\lambda_{af} + L_d I_{ds0})}{L_q} \\ a_{21} &= \frac{L_q}{L_d}\omega_{s0}, \;\; a_{22} = -\frac{R_s}{L_d}, \;\; a_{23} = \frac{L_q}{L_d} I_{ds0} \\ a_{31} &= k_1(\lambda_{af} + (L_d - L_q) I_{ds0}), \;\; k_1 = \frac{3}{2}(\frac{P}{2})^2 \frac{1}{J} \\ a_{32} &= k_1(\lambda_{af} + (L_d - L_q) I_{ds0}), \;\; a_{33} = -\frac{B}{J} \end{aligned}$$

For the sake of compactness in the formulation, the load torque has been absorbed as an input [4]. For designing q-axis current controller, we obtain transfer function between q-axis stator current and q-axis stator voltage as shown in Fig. 2, we consider

$$Y = CX + DU$$

where

$$\begin{aligned} C &= [1 \;\; 0 \;\; 0], \\ D &= [0 \;\; 0 \;\; 0]. \end{aligned}$$

From the state-space model, the transfer function can be obtained as [30]

$$G_i(s) = \frac{Y(s)}{U(s)} = [C(sI - A)^{-1} B + D]. \tag{3}$$

The PMSM parameters are given in Table I.

Disturbance-Observer-Based Sensorless Control of PMSM Using Integral State Feedback Controller

Aishwarya Apte, Vrunda A. Joshi, Hrishikesh Mehta, and Rahee Walambe

Abstract - The objective of this article is to design robust speed control of a permanent magnet synchronous motor (PMSM). The mathematical model of the PMSM is highly nonlinear with uncertainties and disturbances. The most obvious method is to estimate these disturbances and design a robust controller to attenuate the effect of disturbances from the output. In this article, the load torque, which typically occurs as disturbance in the servo system, is estimated using a disturbance observer (DO). A nonlinear model of the PMSM is linearized using the Jacobian linearization around an operating point, and a state feedback controller with an integral term is designed for this operating point. Novelty of the proposed method lies in the way the DO is used to update this operating point, which is similar to the gain scheduling approach. To extend this method for sensorless operation, a sliding-mode observer is used with the DO in cascade. The proposed scheme is validated using simulations in MATLAB/Simulink and an experimental setup using TMS320F28027. The results show improved performance as compared to conventional methods over a wide range of speed.

Index Terms - Cascaded observer, disturbance observer (DOB), Jacobian linearization, permanent magnet synchronous motor (PMSM), sensorless, sliding-mode observer (SMO), state feedback controller (SFBC), vector control.

I. Introduction

Permanent magnet synchronous motors (PMSMs) are used in many applications because of their advantages, such as high torque-to-weight ratio and high efficiency. This necessitates the need of robust speed control of the PMSM. The commonly used speed control scheme used for the PMSM is vector control, where the constant torque angle, $\delta = 90^{\circ}$, is obtained by the zero direct-axis current [1]. This requires three proportional integral (PI) controllers: one for the direct-axis current to the reference $i_d = 0$, another for the quadrature-axis current to the i_q and for the speed with the reference ω^*. These cascaded PI controllers are popular in motor drives because of their simple implementation [2], [3].

The mathematical model of the PMSM is nonlinear. Model uncertainties and disturbances are also present in the PMSM. Load torque is considered as a disturbance acting on the motor. The objective of a control engineer is to compensate, reject, or attenuate these disturbances or uncertainties. The most obvious method is to estimate these disturbances and design a controller to attenuate their effect.

A number of disturbance estimation techniques have been proposed in the literature. A comprehensive study of different disturbance estimation techniques is available in [4]–[6]. The most common is disturbance observer (DO). Many forms of the DO are available in the literature [7]–[9]. The unknown input observer (UIO) [10], [11] technique estimates unknown external input. The UIO estimates state as well as disturbance. The perturbation observer estimates unmodeled plant variations [12]. The extended state observer (ESO) proposed by Han [13] is used for the estimation of state as well as disturbance. The ESO requires the system to be represented in a companion form. The DO, UIO, and ESO are most extensively researched and applied. The DO developed for the nonlinear system becomes a nonlinear disturbance observer. The DO has taken many forms, such as basic DO, DO for an exogenous system, DO for higher order disturbance estimation, etc. In [14], the stabilization problem of stochastic nonlinear delay systems with exogenous disturbances and the event-triggered feedback control is studied. In [15], C^1 and C^∞ controllers are designed for a class of stochastic nonlinear systems with the aid of homogeneity with monotone degrees with the backstepping approach. In [16], the problem of the output feedback stabilization of stochastic feedforward systems with unknown control coefficients and the unknown output function is studied. In [17], a robust control strategy based on the DO is proposed for a class of uncertain systems with intermittent measurement. The DO has been effectively used for robust control of many applications. It is a very promising method for disturbance estimation and control.

In the literature, various disturbance estimation techniques are used for robust control of the PMSM. In [18] and [19], the ESO is used for disturbance estimation of the PMSM, and the disturbance rejection technique is used for the speed controller in the PMSM. In [20], nonlinear DO-based control is used for the PMSM drive system with mismatched uncertainty. In [21], predictive functional control is introduced along with the ESO to optimize the control performance of the PMSM. In [22], model reference adaptive control with disturbance estimation using the ESO is used for speed regulation of the PMSM. In [23], the PMSM is controlled using the terminal sliding-mode control method. In [24], sensorless control of the PMSM using DO-based control is implemented. In this article, load torque and back electromotive force (EMF) are estimated using the DO. In [25], a DO-based composite speed controller is developed for the PMSM with mismatched disturbance. In [26], a DO-based fractional-order PI controller is developed for the

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PMSM. In [27], a two-degree-of-freedom controller is proposed for robust speed regulation in PMSMs. In [28], model-predictive control is used for speed ripple minimization of the PMSM.

It is to be noted that in all these methods, robust operation of the controller is achieved using design of controllers negating disturbance. A novel approach developed in this work uses the DO to refresh the operating point. The PMSM model is linearized around this operating point. The operating point is updated using the DO. The state feedback controller (SFC) is designed using this updated linearized model, which is the main contribution of this article. Since at each point, controller gains are updated, it can be termed as gain scheduling. In addition to this, a cascade operation of two observers, i.e., sliding-mode observer (SMO) and DO, is proposed to obtain sensorless control.

The remainder of this article is organized as follows. Section II discusses vector control of the PMSM with its mathematical model (nonlinear as well as linear). Section III presents the design of the proposed sensorless algorithm. Section IV discusses simulation results with the proposed algorithm. Section V presents experimental results. Section VI concludes this article.

II. Vector Control of the PMSM

The mathematical model of the PMSM is developed by transforming three-phase variables from the stator reference frame to two-phase variables in the rotor reference frame dq [1]. The rotor flux axis is assumed to be aligned with the d-axis of the machine. Also, it is assumed that the inductance is independent of the rotor position.

The generalized nonlinear mathematical model of the PMSM [1] in the rotor reference frame is given by

$$\begin{aligned} v_q &= R_s i_q + L_q \frac{di_q}{dt} + \omega_r L_d i_d + \omega_r \lambda_{af} \\ v_d &= R_s i_d + L_d \frac{di_d}{dt} - \omega_r L_q i_q \\ \frac{d}{dt}\omega_m &= \frac{1}{J}(T_e - T_L - B\omega_m) \\ T_e &= \frac{3}{2}\cdot\frac{P}{2} i_q(\lambda_{af} + (L_d - L_q) i_d) \end{aligned} \tag{1}$$

where

v_q and v_d = voltages in the q- and d-axis windings, V.
i_q and i_d = q- and d-axis currents, A.
R_s = stator resistance per phase, Ω.
λ_{af} = armature flux linkages due to rotor magnets, V·s.
L_q and L_d = quadrature- and direct-axis stator self-inductances in rotor reference frames, H.
T_e = electromagnetic torque, N·m.
T_L = load torque, N·m.
ω_r = electrical rotor speed, rad/s.
ω_m = mechanical rotor speed, rad/s.
P = number of poles.

The relation between the electrical speed and the mechanical speed is given by

The model given by (1) is written in state-space form as

$$\begin{aligned} \frac{di_q}{dt} &= \frac{v_q}{L} - \frac{R_s}{L} i_q - \omega i_d - \frac{\lambda_f}{L}\omega \\ \frac{di_d}{dt} &= \frac{v_d}{L} - \frac{R_s}{L} i_d + \omega i_q \\ \frac{d\omega}{dt} &= \frac{K_t}{J} i_q - \frac{B}{J}\omega - \frac{P}{2*J} T_L \end{aligned} \tag{3}$$

where $[i_q \;\; i_d \;\; \omega]$ are states of the system and $[v_q \;\; v_d]^T$ are inputs. Load torque appearing on the motor is considered as external disturbance $d = -\frac{P}{2*J} T_L$.

The conventional vector control scheme for the PMSM is shown in Fig. 1. The figure shows three feedback loops with three PI controllers. The outermost loop is for speed and inner two loops are current loops (q-axis and d-axis current). The control scheme used is constant δ (torque angle), and it is maintained at 90° electrical. This requires direct-axis current i_d to be forced to 0. Each of the PI controllers in a loop is required to be tuned when operating condition changes. Tuning of the PI controller is tedious and intuitive. The controller developed in this article computes the gain in runtime for every change in the load condition. The proposed algorithm is discussed in the following section.

III. Proposed Scheme

Fig. 2 shows the block diagram of the proposed scheme. Stator currents i_a and i_b are measured using current sensors, and i_c is calculated assuming the balance load condition

$$i_a + i_b + i_c = 0. \tag{4}$$

The Clarke transformation is used to obtain i_α and i_β, and Park's transformation is used to obtain i_d and i_q from these stator currents. The SMO works in the $\alpha\beta$ reference frame, and estimates speed ω and position θ using i_α and i_β. These estimations are used for vector control. Additionally, ω is used in the DO for estimation of load torque disturbance, resulting in the calculation of i_q^*, which is the reference generated for the quadrature-axis current. This estimation of i_q^* helps in updation of the operating point of local linearization for designing an integral state feedback controller (ISFC) adaptively. The scheme is explained in detail as follows.

A. Linearized Model of the PMSM

The model described in (3) is linearized using the Jacobian linearization [29], [30].

$$\dot{x} = \begin{bmatrix} -\frac{R_s}{L} & -\omega_o & -\frac{(\lambda_f + LI_{do})}{L} \\ \omega_o & -\frac{R_s}{L} & I_{qo} \\ \frac{K_t}{J} & 0 & -\frac{B}{J} \end{bmatrix} x + \begin{bmatrix} \frac{1}{L} & 0 \\ 0 & \frac{1}{L} \end{bmatrix} u + \begin{bmatrix} 0 \\ 0 \\ 1 \end{bmatrix} d. \tag{5}$$

NO ACCESS

Hybrid neural network with bat approach for smart grid fault location

Mangal Hemant Dhend and Rajan Hari Chile

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ABOUT

Abstract

This paper proposes identification of fault location in smart distribution grid based on artificial intelligence using currents and voltages measured; with the help of sensor nodes in distribution system. The approach presented here is the hybrid bat algorithm with neural network, implemented on latest smart distribution system which comprises distributed generation. The fault lengths for various types of faults on distribution feeders are recognised using system parameters measured, before and after the occurrence of a fault. For verifying the performance of proposed algorithm, the MATLAB-based coding is developed and executed on sample modified IEEE test feeders. The performance of a proposed technique is compared with the simple neural network method. The proposed method founds more accurate and fast in speed.

Keywords

artificial neural network, ANN, bat algorithm, fault location, smart grid, distribution system

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Hardware Implementation of FUZZYSMC based Speed Control of BLDC Motor

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***Abstract*—In recent times, BLDC motors are most popular motors in industry due to their vast speed range, efficiency and low maintenance. There are many control methods invented to control speed of BLDC motors. Some of these are PI, SMC, PID, FUZZY, FUZZY-PID, &FUZZY-SMC etc. FUZZY SMC control system is a control system where the speed control is obtained by sliding mode control system and its chattering and slow response is controlled by using fuzzy logic by adjusting gain of control term. This paper presents hardware implementation for the speed control of BLDC motor using FUZZYSMC controller and the efficiency of the proposed system is observed with simulated and hardware results in terms of settling time, overshoot, undershoot etc.**

Keywords*—BLDC motor; Sliding mode control; fuzzy logic.

I INTRODUCTION

BLDC motor is as superior as dc motor but its commutation is done electronically. Losses in the BLDC motor are less due to electronic commutation and hence this motor is gaining rapid attention in industry. Commutation is nothing but linkage between drive state and respective sensor output. BLDC motor consists of three phases connected with star or delta connection. This motor operates by energization of two phases with one phase floating. So basically main action of commutation is to sense position of rotor and accordingly energies phases which will leads to maximum torque. Maximum torque is obtained when the permanent magnet rotor is 90 degrees away from the stator magnetic field. Generally Hall Effect sensors are used and they give high and low signal for each 180 degree and they are placed 120 degree apart from each other. During running condition of motor, the permanent magnet rotor moving behind the stator coils induces an EMF in the coils called Back Electromotive Force and is directly proportional to the motor speed. If back EMF and applied voltage are equal i.e. ideal condition, then motor will draw excess current which will blow out switches in the drive circuitry Practically back EMF is always less than applied voltage. Speed of motor is directly proportional to applied voltage hence by varying PWM linearly will result in linear speed control. In this paper, section II presents drive circuitry for BLDC motor, section III presents various speed control techniques for BLDC motor. Section IV presents control algorithms used in the proposed system. Section V presents hardware setup and components used. Section VI and VII presents simulated and hardware results. Section VIII and IX presents performance comparison between control systems and conclusion respectively.

II VSI FED BLDC MOTOR

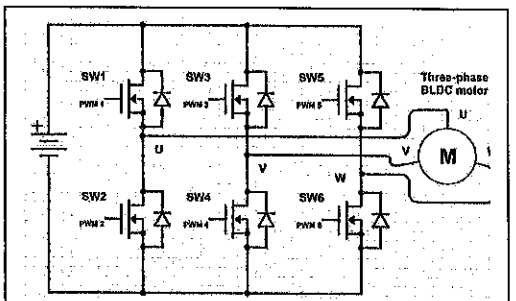

Figure 1 Inverter Circuit

Fig 1 shows VSI fed BLDC motor, both high side and low side drivers should not conduct at same time because off time is more than on time so until and unless complete commutation of high side driver is done, low side driver should not conduct .No drivers in the same leg should conduct at a time to avoid short circuit which is called dead time.

III SPEED CONTROL TECHNIQUE

For speed control of BLDC motor there are many control systems developed like PI, fuzzy-PID, SMC, FUZZY etc. The suitability of any control system is depends on its response time, dynamic load conditions, robustness and cost. The system which fulfils all these conditions is said to be a good control system.

A. PI controller:

PI controller is a most commonly used controller. It increases order as well as type of the system. Steady state error decreases with increase in type and order of the system [3].The tuning of gain is the most important task in PI controller it minimizes error. PI has slower response because of integrator and there should be proper tuning of gains so as to maintain stability of system.

B. Sliding Mode Controller:

Sliding mode control system is one of the type of variable structure control which makes continuous switching of control based on present state of the system. Sliding mode control is gaining popularity due to its robustness. Sliding mode is invariant to any variations in system parameters [9]. Sliding mode reduces order of the system. In case of ideal

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Fuzzysmc based Speed Control of BLDC Motor

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***Abstract*—DC motors are popular in industry. Owing to benefits like higher starting torque, variable speeds with varying input voltage and cheaper to control than AC but they suffer from certain drawbacks due to the presence of commutator and brushes. On the other hand, a BLDC motor doesn't have commutator and brushes and therefore has many advantages over normal dc motor. BLDC motor has very vast speed range but its speed control is difficult. In literature, there are many control techniques reported to control speed. This paper presents FUZZYSMC based speed control of BLDC motor, by combining the beneficial features of both sliding mode control and fuzzy logic. This design is compared with PI controller. MATLAB Simulink model is developed for both the control strategies for different loading conditions. System is tested for various parameter changes and accordingly speed response is observed. From simulation it is evident that, FUZZYSMC controller is better than PI controller in terms of rise time, settling time etc.**

Keywords*—BLDC motor; sliding mode control; fuzzy logic;PI controller.

I INTRODUCTION

A brushless dc motor is a permanent magnet synchronous motor that has trapezoidal back emf. It possess same characteristics as that of dc motor. Due to absence of brushes and commutator, BLDC motor has many benefits than DC motor, such as high efficiency, faster acceleration, no sparking, less maintenance and longer life. For commutation purpose rotor sensors are employed. Speed control is very important part in BLDC motor. It can be done by using different controllers like PI [16], PID [2], and SMC [14], FUZZY [15] etc. Most popular of these controllers is PI controller.

The control system used for regulating speed should ensure that the steady state error is small and the transient response is also satisfactory. The speed of motor is largely affected by varying load conditions. It is thus the duty of a controller to maintain the speed regulated to the desired value. As the load on the motor changes, the PI controller parameters are needed to be retuned to give the same performance. However, a robust control like Sliding Mode is able to deliver the same performance in the event of changing load conditions. This paper presents combination of FUZZYSMC controller which takes into account advantages of both fuzzy and SMC, and makes easy operation of BLDC motor for various speeds. It is then compared with conventional PI controller.

II VSI FED BLDC MOTOR

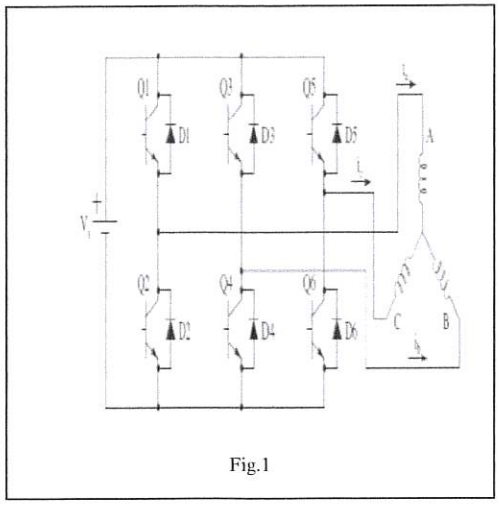

Fig.1

A brushless dc motor with voltage source inverter is shown in fig (1).For commutation purpose rotor sensors are employed. According to rotor position, coils are energized in specific sequence to run the motor [2].

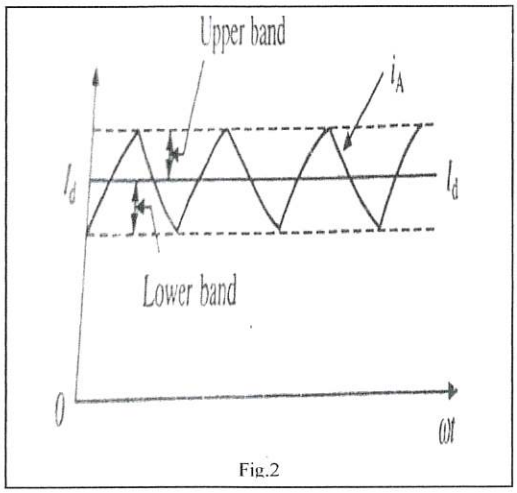

Fig.2

The stator winding current pulses are shown in Fig. (2). Currents are placed where EMF induced is greatest and constant [11]. By way of alternative turning on and off the thyristors, stator current follows the reference current. According to faradays law of electromagnetic induction, there is interaction between permanent magnet rotor flux and flux produced by stator coil, which forms torque. This torque shifts

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Comparison of Conventional Single Phase 21-level Cascaded H-Bridge Multilevel Inverter and Single Phase 21 Level Multilevel Inverter with Reduced Switches and Sources for Renewable Energy Applications

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Abstract— Multilevel Inverters are influencing many industries because of their applications in renewable energy with low switching losses, low THD and high dv/dt stress. In this paper, conventional single phase 21 level cascaded H-bridge multilevel inverter and single phase 21 level multilevel inverter with reduced switches and sources have been compared. Here, a conventional single phase 21 level cascaded H-bridge multilevel inverter and 21 level multilevel inverter with reduced switches and sources, the switching angles and the corresponding time required to generate the gating pulses of IGBT switches of both multilevel inverters is calculated by Equal Phase (EP) Method. The conventional single phase 21 level cascaded H-bridge MLI with 40 IGBT switches and 10 separate DC sources whereas multilevel inverter with reduced switches and sources require only 8 IGBT switches and 4 separate DC sources to obtain 21 level output voltage. Since, in case of 21 level multilevel inverter with reduced switches and sources, the number of switches are less, the cost is less and the circuitry is simple. The simulation results of both were presented using MATLAB/SIMULINK.

Keywords— Multilevel Inverter (MLI), Equal Phase(EP), Separate DC Sources (SDCS), Total Harmonic Distortion (THD).

Multilevel inverters continue to receive more and more attention because of their high voltage operation capability, low switching losses, high efficiency and low Total Harmonic Distortion (THD). The term multilevel starts with the three-level inverter introduced by Nabae et al (1981). Nowadays, multilevel inverters are becoming increasingly popular in power applications, as multilevel inverters have the ability to meet the increasing demand of power rating and power quality associated with reduced harmonic distortion and lower electromagnetic interference.

There are different types of inverter topologies are available in which some are popular. Different types of MLI are Diode Clamped MLI, Flying capacitor type MLI and Cascaded H-Bridge multilevel inverter and that is very popular among all the topologies. In this paper, conventional single phase 21 level Cascaded H-Bridge Multilevel Inverter and single phase 21 level multilevel inverter with reduced switches and sources have been compared. The output voltage results were simulated and presented in this paper[1][2].

Also, Switching angles of both multilevel inverters can be calculated by following methods:-

- Equal Phase (EP) Method.
- Half Equal Phase (HEP) Method.
- Half Height (HH) Method.
- Feed Forward (FF) Method.

In this paper switching angles of both a conventional single phase 21 level cascaded H-bridge multilevel inverter and single phase 21 level multilevel inverter with reduced switch and sources have been calculated by using Equal phase method. Finally, these two topologies have been compared and corresponding work has been embodied as follows.

I. CONVENTIONAL SINGLE PHASE 21 LEVEL CASCADED H-BRIDGE MULTILEVEL INVERTER

As the name suggest, conventional single phase cascaded H-bridge multilevel inverter is constructed by a series of H-bridge inverter in cascade configuration. This type of topology is a conventional configuration structure. The topology proposes a concept with a use of separate DC sources connected to each H-bridge to generate a sinusoidal voltage. The final ac output voltage is produced by cascading the individual H-bridge voltage outputs[3].

Figure 2.1 illustrates a generalized block diagram of Conventional Single Phase m-level Cascaded H-bridge Multilevel Inverter. In this case, 21 different voltage output levels were generated for each inverter level with an appropriate control scheme of the switches. The output waveform is generated was as according to the switching table given below in the table. The sum of different individual H-bridge inverter outputs connected in series synthesized the final sinusoidal output voltage of the multilevel inverter. An equation $m=2s+1$ determine the number of voltage levels 'm' in a conventional single phase 21 level cascaded H-bridge inverter where 's' is the number of independent DC source connected to the individual H-bridge inverter. Thus there were 10 separate DC sources used in this topology. The final output voltage $V_{a[(m-1)/2]}$ is a sum of all individual voltage values of H-bridges connected in cascade. The simulink result of voltage output is shown in Figure 2.2. Also THD analysis of conventional single phase 21 Level cascaded H-bridge MLI

DIRECT TORQUE CONTOL OF PERMANENT MAGNET SYNCHRONOUS MOTOR USING SVPWM

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Abstract — Recent research has shown that for high performance servo applications Permanent magnet Synchronous motor could become a serious competitor to the induction motor (IM). In this paper Direct Torque Control (DTC) of Permanent Magnet Synchronous Motor (PMSM) using SVPWM is studied. It was observed that DTC based control of PMSM using SVPWM gives better performance of speed control. The method is verified with simulation using MATLAB/SIMULINK.

Keywords — Direct Torque Control , Park transform , Clarke transform, Vector control, SVPWM. Introduction

Permanent magnet (PM) synchronous motors are progressively replacing dc motors in high-performance applications like robotics, aerospace actuators and industrial applications. The PMSM is more efficient and has a larger torque inertia ratio and power density when compared to the IM for the same output capacity. The PMSM is smaller in size and lower in weight that makes it preferable for certain high performance[1][2][4].

The conventional DTC of PMSM has received considerable investigation for its advantage of quick change of torque, robustness and simplicity [1]. However, only six valid voltage vectors are available in conventional DTC which induce such problems as large torque ripple and variable switching frequency [2]. Hence the space vector modulation -direct torque control (SVM-DTC) was presented in which the along with hysteresis control of torque and stator flux hysteresis controller in conventional DTC, reference voltage calculator and space vector modulation unit are used. The SVM-DTC can provide constant switching frequency and more accurate Stator flux and torque control[1][3][5][6].

How to calculate reference voltage vector is an important issue in SVM-DTC.

This paper investigates an improved method of SVM-DTC in which the reference voltage is calculated with the flux position, errors of flux and torque. The method is simple to implement and robust. The improved SVM-DTC is verified by simulation and proved to decrease torque ripple effectively and be strong[7][9][20][21].

I. MATHEMATICAL MODEL OF PMSM

The model of surface-mounted Permanent magnet synchronous motor in the rotating reference frame(d,q) can be expressed as follows:

$$v_{sd} = R_s i_{sd} + \frac{d\Psi_d}{dt} - \omega_r \Psi_{sq}$$

$$v_{sq} = R_s i_{sq} + \frac{d\Psi_q}{dt} - \omega_r \Psi_{sd} \quad (1)$$

$$\Psi_{sd} = L_{sd} i_{sd} + \Psi_f$$

$$\Psi_{sq} = L_{sq} i_{sq} + \Psi_f$$

$$T_e = \frac{3}{2} n_p i_{sq} \Psi_f$$

Where and are direct and quadrature axis voltage, and are direct and quadrature axis current, is the stator resistance, and are direct and quadrature flux, and are direct and quadrature axis inductance, is the permanent magnet flux, is the electrical rotor speed, number of pole pair[11][12][13].

II. CONTROL SCHEME

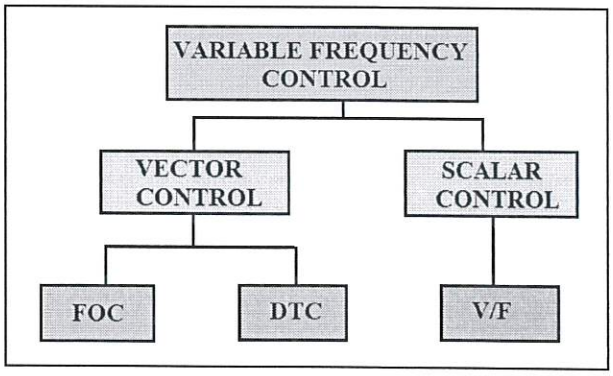

Figure 1 Types of speed control

Scalar control, as the name indicates, is due to magnitude variation of the control variables only, and disregards the coupling effects of the machine. For example, frequency or slip of a machine can be controlled to control the torque and the voltage can be controlled to control the flux,. However, torque and flux are also functions of voltage and frequency, respectively. Vector control or field oriented

Original

A Framework for Optimal Attribute Evaluation and Selection in Hesitant Fuzzy Environment Based on Enhanced Ordered Weighted Entropy Approach for Medical Dataset

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ABSTRACT

Background: In this paper, a generic hesitant fuzzy set (HFS) model for clustering various ECG beats according to weights of attributes is proposed. A comprehensive review of the electrocardiogram signal classification and segmentation methodologies indicates that algorithms which are able to effectively handle the nonstationary and uncertainty of the signals should be used for ECG analysis. Extensive research that focuses on incorporating vagueness in the form of fuzzy sets, fuzzy rough sets and hesitant fuzzy sets (HFS) has been in past decades.

Objective: The paper aims to develop an enhanced entropy based on the clustering technique for calculating the weights of the attributes to finally generate appropriately clustered attributes.

Material and Methods: Finding optimal attributes to make a decision has always been a matter of concern for the researchers. Metrics used for optimal attribute generation can be broadly classified into mutual dependency, similarity, correlation and entropy based metrics in fuzzy domain .The experimentation has been carried out on ECG dataset in a hesitant fuzzy framework with four attributes.

Results: We propose a novel correlation based on an algorithm that takes entropy based weighted attributes as input which effectively generates a relevant and non-redundant set of attributes. We have also derived correlation coefficient formulas for HFSs and applied them to clustering analysis under framework of hesitant fuzzy sets. The results show the comparison of the proposed mathematical model with the existing similarity based on algorithms.

Conclusion: The selection of optimal relevant attributes certainly highlights the robustness and efficacy of the proposed approach. The entire experimentation and comparative results help us conclude that selection of optimal attributes in hesitant fuzzy domain certainly prove to be a powerful tool in order to express uncertainty in the process of data acquisition and classification.

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Keywords

Hesitant Fuzzy Sets, ECG, Correlation Coefficients, Entropy, Weights

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Introduction

Electrocardiogram classification and segmentation have been subjects of research for a prolonged period since the enormous deaths occur worldwide due to uncertainty and variability in the diagnosis of heart diseases. Health care systems have undergone revolutionary changes to provide timely and relevant information about the patients'

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Performance Assessment of Robust & Efficient video stabilization algorithms based on L1-L2 optimization and s-R-t transform

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ABSTRACT: ***Video stabilization is the method of removing unwanted movement from a video stream. Our objective is to stabilize video which contains undesirable camera jitters because of unstable camera motion. In this paper, we have proposed three algorithms for stabilization of jittery videos.***

1. Video stabilization based on L1 norm
2. Video stabilization based on L1&L2 norm
3. Video stabilization based on s-R-t transform

The first algorithm is based on L1 norm. L-1 norm is related with Least Absolute Deviation (LAD) or Least Absolute Error (LAE). It is minimising sum of absolute difference between consecutive video frames. To obtain the optimal camera path composed of distinct constant, linear and parabolic segments, we have minimised the first, second, and third derivatives of the resulting camera path. L-1 norm algorithm allows for video stabilization beyond the conventional filtering of camera paths which suppresses high frequency jitters.

The second algorithm based on L1-L2-norm. L2 optimization achieves the best estimation in least square sense. In order to keep the boundary information of original videos as much as possible optimal smooth camera path should be close to the original path. λ is a weight to adjust the smoothness of path. It can be treated as a factor which controls the degree of stabilization.

In the third Algorithm, *hybrid technique which is the combination of RANSAC and s-R-t transform is proposed to stabilize jittery videos.* ***RANSAC algorithm is used to find effective inlier correspondences and afterward it derives the affine transformation to map the inliers in consecutive video frames.*** *Camera motion is corrected by affine transform.* ***Then s-R-t Transform (scale-rotation-translation) is constructed for motion compensation. This transform makes smoothening of video frames and also removes jitter in video. Comparing the stabilized and shaky video it is confirmed algorithm based on L1-L2 norm satisfy the human perception and there is remarkable elimination of high jitter from shaky videos.***

Key words: ***Video Stabilization, L1 optimization, L1-L2 optimization, camera path, RANSAC Algorithm, Inlier and outliers correspondences, Affine Transform, s-R-t Transform,***

1. INTRODUCTION

Recently, market of handheld camera has grown rapidly. It is difficult for amateur recorders to make shooting of video sequences with hand-held devices [1]. Video capturing by non-professionals or armatures will lead to unanticipated effects like image blurring, image distortion etc. In case of shooting camera attached to the moving vehicle has, jerks and vibrations due to which jittery video are produced. Many researchers are working on such problems to improve the grade of recorded videos [2].

Video stabilization is the method of removing unwanted movement from a video stream.

Generally the processes of stabilization undergoes three phases namely 1) Motion estimation 2) Motion smoothing 3) Motion compensation. The objective of first phase is to estimate the motion of the moving objects in the frames. In the second phase, parameters of estimated motion are utilized for motion smoothening, which calculates the global transformation and t removes the high-frequency distortion [12]. Next, warping is essential for motion compensation to get stabilized video. These are fundamental steps in the video stabilization technique [6].

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ORIGINAL ARTICLE

A novel entropy-based weighted attribute selection in enhanced multicriteria decision-making using fuzzy TOPSIS model for hesitant fuzzy rough environment

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Abstract
The existing approaches of multicriteria decision-making (MCDM) process might yield unreliable and questionable results. The notable challenges of MCDM approaches are rank reversal paradox and uncertainty. The prime inspiration for researchers is the MCDM for hesitant fuzzy sets (HFSs). In some scenarios, the decision-makers could not choose one from numerous values while expressing their preferences. HFS which is the extension of fuzzy sets (FS) is found to be helpful in solving such decision-making (DM) problems. The DM process is revolutionized with the commencement of powerful and efficient tools of data representation for expressing vagueness and uncertainty in data sets as FSs (both generalized and hesitant ones). This paper copes with one such novel approach that involves entropy-based attribute weighting, followed by an evaluation of approximate sets in the fuzzy rough framework. Correlation of the input alternatives in respect of evaluation criteria and the output class is evaluated. With the fuzzy technique for ordered preference by similarity to ideal solutions (FTOPSIS), the generated correlation matrix is utilized for calculating the degree of closeness (δ) of the output classes to the input alternatives. This paper made a novel contribution of performance indicator centered on FTOPSIS for the hesitant fuzzy rough domain. The proposed method's efficiency is established through comprehensive and systematic experimentation on datasets utilized by researchers globally. The proposed algorithms prove its ability to handle datasets that involve human-like hesitant thinking in the MCDM system by contrasting with the existing ones.

Keywords Uncertainity · Hesitant fuzzy sets · Decision-making · Correlation · TOPSIS

Introduction

For decades, MCDM has remained as an inexorable topic of research. Optimum selection of alternatives considerably affects the DM of picking a suitable one from a provided set of conflicting criteria. The uncertainty and vagueness involved with the human DM process could be effectually modeled by FS theory. MCDM embraces attributes, decision methods, selection criteria, and even subjective estimation of experts [1]. Improvisation in classical FSs [2] was done for handling the uncertainties and vagueness. Extended versions of FSs embrace fuzzy rough sets (FRS) [3] which could handle the indiscernible datasets effectually in a fuzzy framework. Researchers made countless attempts for incorporating real-life complex scenarios that involve uncertainty into the datasets and solve it utilizing FTOPSIS [4–7]. It has now been meticulously adopted in several use cases on account of its simplicity, comprehensive mathematical concept along with computational efficiency. The extension of the classical TOPSIS approach in regard of fuzzy logic, namely FTOPSIS, has also been effectively implemented in disparate applications like Networks, Supply Chain Management, Defense Industry, Construction, Healthcare, etc., FTOPSIS was employed in countless practical use cases, starting from choosing a suitable supplier for manufacturing through assessment of service

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Mathematical Modeling, Control Design, Simulation & Implementation of Electric Vehicle Charger

R. G. Mapari, D. G. Bhalke, Rahul Parbat

Abstract: A proposed technique to deal with improves the power factor of single-stage rectifiers and to control the load voltage against the adjustment in grid voltage and load is exhibited. This converter topology is assessed based on execution and its remarkable highlights like simple in construction, cost efficient and high degree of performance are communicated about to examine its correctness. The proposed control technique is bridgeless, transformer-less and output current sensor-less and comprises of just two Bi-directional IGBTs and two diodes. The voltage control is accomplished by a simple voltage divider to convey to a controller to control the duty cycles of pulse width modulated signal. This paper concentrated on the numerical displaying of single stage bi-directional converter utilized in electric vehicle.

Keywords: Bridgeless-Sensor-less-Transformer-less converter, duty cycle single phase converter, PWM converter, voltage regulation.

I. INTRODUCTION

In upcoming years, the design and development of electric vehicles (EVs) is estimated to boost exponentially, because of the wasting of oil and the natural effect related with its utilization. Hence, there is an inclination to arrange endeavors to decrease urban contamination and ozone harming substance outflows.

At present, one of the most significant issues in EV improvement is the lack of charging foundation [1] [2]. One can charge EVs at home; however the charge time is very long. To advance the EV improvement, it is important to introduce quick charging mechanism for charging stations in which the EV battery must be charged in very small time. On the other hand, the weakness of quick charging is the powerful request and its effect on the framework. So as to address this, sustainable sources and capacity frameworks can be introduced in these stations [2].

This paper is centered on the factor of mathematical modelling of an EV quick charging strategy. So as to improve the gainfulness of the quick charging stations and to diminish the high vitality requested from the conventional electricity sources.

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II. MODELING

In primary stage, modelling of primary switch, driver, controller inductor and capacitor design has been considered for complete modeling of single phase converter.

A. Modeling of Switch

Identification the importance, IGBT semiconductor device as a switch is chosen. As IGBT having features like high switching recurrence and high current conveying capacity. The examination among IGBT and MOSFET switch dependent on frequency and voltage handling of capacity is appeared in Fig. 1.

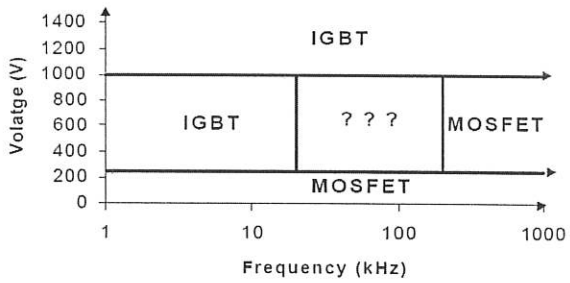

Fig. 1.Comparison between IGBT and MOSFET switch

B. Modeling of Driver

For active conversion of voltage sources author choose IGBT switch as mentioned in above section. To drive IGBT's two driver cards are available, one is International Rectifier (IR) series most popular IR210 and second is VLA 503 hybrid IC. According to our design most suitable driver is VLA503 because of its features as mentioned below [3],

- Electrical isolation- High and low voltage isolation between input and output of the system through optocoupler,
- No bootstrap operation is required,
- Gate suddenly OFF the switch due to +15V and -9V provision.

C. Modeling of controller

For controlling and computerized usage of a large portion of the piece of the framework creator favored DSPic33FJ64mc802 controller, which having every one of the highlights of advanced sign processor (DSP). ASIC IC's are readily available in the market which having all operations in one pack.

Audio Fingerprinting using Chromogram Features

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Abstract—Audio fingerprint is has become popular because of faster identification of song. When we want to play song on the radio and if we don't have any information about it, audio fingerprint can be used. The proposed system generates an audio fingerprint using chromogram features of input song and compares with the audio database stored. After comparing it finds best match and displays the information about song and plays back the song.

Keywords—Chromogram, Audio Fingerprint

1. Introduction

An audio fingerprint system is a content based compact signature that summarizes an audio recording. An audio fingerprint is useful for establishing the perceptual equality of two audio objects by comparing the associated fingerprints. The fingerprints of large number of songs are stored in the database along with their metadata [singer name, film]. This system is useful to get the information regarding songs and plays back the song. An audio fingerprint system consists of different steps: pre-processing, feature extraction,fingerprint database and matching of fingerprints. The feature extraction plays a vital role, so feature can be selected which is robust to signal degradation. Different methods have been used togenerate an audio fingerprint like J. Haitsma and T. Kalker proposed a highly robust audio fingerprint system in which 32 bit fingerprint is extracted [1]. E. Unal et.al proposed a system for audio fingerprint using query by humming [2].

In this paper, audio fingerprint is generated using Chromogram features. The rest of the paper is arranged as follows: Section 2 presents the proposed method. Section 3 presents results and Section 4 presents references.

The generated fingerprint should be Invariance to distortion, compact in size, computationally less expensive, and Faster Identification.

The following performance measures are used for audio fingerprint.

Robustness: The system must be robust to correctly identify the audio in the presence of noise.

Reliability: This measures of correct identification.

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Musical instrument identification using Bispectrum and trispectrum features

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ABSTRACT

The main objective of this research is to develop an automatic instrument recognition technique using bispectrum and trispectrum features and KNN as classifier. The proposed technique of automatic instrument recognition is done in three phases such, i) pre-processing, ii) feature extraction, and iii) Classification. Initially, signals are given to pre-processing steps to make signals suitable for feature extraction. In feature extraction stage, higher order spectra (bispectrum and trispectrum), are extracted as feature components. The KNN is used for classification.

Keywords: *Bispectrum, Trispectrum, KNN.*

1. INTRODUCTION

In this research work a computer system will listen to musical note played and recognize the type and family of musical instrument.

Brown et al. [1], [2] used cepstral coefficients based on the constant-Q transform and a k-means classifier to differentiate between recordings of oboe and saxophone with an error rate of 15%. Martin and Kim [3] built a system that identified 15 musical instruments using isolated tones. They used test and training data that was recorded using different instruments. The authors reported an error rate of 28.4%. Further, Marques and Moreno [4] used SVMs and Gaussian Mixture Models (GMMs) for instrument identification and reported recognition rate of 70% for eight instruments (bagpipes, clarinet, flute, harpsichord, organ, piano, trombone and violin). Consequently, Eronen and Klapuri [5], used cepstrum coefficients, along with 21 other complementary features such as spectral centroid, spectral spread, rise time, decay time, frequency modulation rate, amplitude modulation rate and fundamental frequency for instrument classification. The author reported an accuracy of 75-80% for 30 instruments playing a single note. Later, Eronen [6] explored a wider range of feature vectors, which included both mel-frequency, LP coefficients and delta coefficients. They analyzed 23 features and also studied the relevance of each feature for classification. Mel-Frequency cepstrum coefficients (MFCCs) alone were able to classify correctly in 20–30% of instances, using 29 instruments. D. G. Bhalke et al. [7] presented an overview of feature extraction scheme for automatic classification of musical instruments using Fractional Fourier Transform (FrFT)-based Mel Frequency Cepstral Coefficient (MFCC) features. The classifier model for the proposed system has been built using Counter Propagation Neural Network (CPNN). The discriminating capability of the proposed features have been maximized for between-class instruments and minimized for within-class instruments compared to other conventional features.

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MARINE BORDER ALERT SYSTEM

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Abstract – The system is proposed to provide the information about location, positioning, Navigation and time details at marine bord The proposed system consists of space, control and user unit. It has a vital tool for solving border crossing issues for fisherman. The sys proposed in this paper is low cost cross border crossing alert system. It continuously monitors, track, alert and control the fisherman's activity fi the remote station located on the shore.

Index Terms -

I. INTRODUCTION

The island such as SriLanka, India, peninsula and many coastal countries are partitioned by marine borders. The occupatior the people living in these areas depends on fishing. In marine areas crossing the border and moving in area of other country is a big cri For example in state of Tamilnadu more than 20 thousand boats are used for fishing. Due to negligence and unknowing of boundary, fisherman used to cross the borders. Once the fisherman cross the border, they are arrested and punished by the authorities of conc countries. The boats of fisherman are also captured by the authorities of concern countries. In such environment the life of fisherr become very difficult. It is a big challenging issue. Such issues ultimately leads to loss of economic income and manpower of country.

The system proposed in this paper will help to solve the boundary crossing problems. In this system GPS, GSM and wirel networks are used to address the cross border issues.

The proposed system is used to devise a low cost alert system for fisherman that gives an alert when the boat/ship crossed bey other country's border. It helps the fishermen not to go afar of border. If the fishermen violate the border agreement, an alarm is genera indicating that the fisherman has violated the rule. In addition, a Global System for Mobile communication supported TX interface v send (forward) a message to base station located on the shore indicating that a vessel has crossed the border. Thus guards in the sh can assist and provide additional help to those fishermen if needed. Keeping in mind about lives of Indian fishermen, this device been created to help them not to move beyond Indian border.

II. LITERATURE REVIEW

A novel approach of geofencing and geotagging system has been used in this paper. The main idea of this paper is to save the li of poor fishermen who is severely punishing by the other country coastal guards. This is achieved with the help of GPS and embed stem. GPS is increasingly being used for a wide range of applications. It provides reliable positioning, navigation, and timing service worldwide users on a continuous basis in all weather, day and night, anywhere on or near the earth. This paper deals on the versatility and usefulness of a GPS device in the sea. The main objective of the paper is to help the fishermen not to navigate beyond other country's bor If a fisherman navigates beyond the country's border, an alarm is generated indicating that the fisherman has crossed the border. Additiona a GSM transmitter interface will send a message to base station located on the sea shore indicating that a boat has crossed the border. Th guards in the shore can assist and provide additional help to those fishermen if needed. Keeping in mind about lives of Indian fishermen, device has been created to help them not to move beyond the border. On the whole, it is an attempt to build a suitable device for fishermen at a reasonably low cost.

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Design & Analysis of MIMO Microstrip Antenna with Improved Mutual Coupling

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Abstract—: *This work presents a defected ground structure (DGS) for a dual component multiple input multiple output (MIMO) antenna with improved mutual coupling. Defected ground structure is accepted as an arising approach for enhancing the different parameters of microwave circuits, which are narrow bandwidth, low gain and isolation. The two-element MIMO antenna operates at 3.3 GHz. The lesigned mimo antenna has a compress size of 26 mm × 40 mm suitable for practical design of an antenna. The antenna can be applicable for WLAN, Wi-Max, Wi-Fi which covers a patch operating at a frequency range 2.7 GHz to 5.1GHz. The antenna attains peak gain of 1.17 dB. Efficiency of the antenna is 94%.*

Keywords — MIMO, Defected Ground Structure, Isolation.

1. Introduction

MIMO (multiple input multiple output) is an antenna technology for wireless communications in which multiple antennas are used at both the origin (transmitter) and the target (receiver). The antennas at both end of the broadcasting circuit are combined to reduce errors and optimize data speed. MIMO technology uses Multipath to boost wireless performance. MIMO technology takes a single data stream and breaks it down into some discrete data streams and sends it out over multiple antennas. MIMO becomes an essential segment of wireless communication excellence which involves WLAN/WPAN, WiFi, WiPro and WiMAX.

The antenna consists of two planar monopoles. Planar monopoles are placed such as to obtain good isolation. Two long ground stubs and short ground strip are exerted to enhance the isolation [1]. Two novel bend slit on ground behind antenna element is used for the reduction in mutual coupling. The slits are tilts by 90º, to reduce the effect of slits on impedance bandwidth [2]. Dumbbell shaped structure is used for the reduction in mutual coupling [3]. A dual slot patch along with parasitic elements is used for isolation enhancement. For the improvement in isolation, two elements are responsible which are parasitic monopole element and symmetric slot element [4]. Novel miniaturized two layer Electromagnetic Band Gap structure is introduced For the reduction in electromagnetic coupling. There is reduction in mutual coupling by using EBG structure [5]. To enhance the isolation and for the design and implementation of antenna modified serpentine structure is used. Modified serpentine structure acts like a band-reject filter, so that the mutual coupling of the antenna is reduced [6]. There is another technique for mutual coupling reduction that is by using metamaterials. This technique attained a -14 dB reduction in mutual coupling at 2.45 GHz and -13 dB at 5.2 GHz [7]. The technique slotted meander-line resonator (SMLR) is used to enhance the isolation in microstrip patch antenna arrays. This structure particularly designed for band-notch function. The proposed design provides an improvement in isolation by -16 dB [8]. Planar electromagnetic band gap (EBG) structure based on a truncated frequency selective surface is used. The reduction in the number of elements and isolation has been examined. By using this technique mutual coupling is reduced by more than -10 dB [9]. Photonic band-gap (PBG) structure is a new structure introduced to improve the isolation of antennas array. The presented technique is using spurline structure in the ground plane between antennas array which effectively suppresses mutual coupling [10].

Here in this paper we are designing a multiple input multiple output (MIMO) microstrip antenna with improved mutual coupling. For the reduction of mutual coupling there are various techniques like Decoupling Networks, Parasitic Elements, Neutralization Lines and Metamaterials. In this paper our aim is to reduce mutual coupling and improve the isolation. For this purpose we are using defected ground ease of use structure technique. The compact geometrical slots embedded on the ground plane of microwave circuits are referred to as Defected Ground Structure (DGS). A single defect (unit cell) or multiple periodic and aperiodic defects configurations may be comprised in DGS. In wireless communication system there is high demand for high data rates and channel bandwidth. It is very necessary in modern wireless system to shift towards multiple input multiple output from single input single output and single input multiple output. MIMO antenna is interesting and attractive topic as it has so many challenges to achieve. Some of the challenges are to improve channel capacity, bandwidth, gain, polarization diversity and reduce coupling between inter elements. As these are the multiple input multiple output antennas i.e. multiple element antennas there is high demand for size minimization so that they can fit in the compact and robust equipment.

Design and Analysis of Microstrip Patch Antenna with Enhanced Bandwidth and Harmonic Suppression for WLAN Applications

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Abstract:- *In this paper, a pair of λ/4 resonator is used in parallel with the rectangular patch to enhance the bandwidth and suppress the harmonic radiations. A pair of λ/4 resonator excites the radiating patch using an electromagnetically coupled technique. The radiating patch and a pair of λ/4 resonator, resonates at two frequencies which are close to each other and help to increase the bandwidth. Also a shorting pin is used which combines the two λ/4 resonators which helps is suppressing the Harmonic radiations. The Proposed antenna is resonating at 3.6GHz. FR4- Epoxy material is used for substrate with relative permittivity of 4.4. The antenna is fed with the Line fed. The Simulation is done using the HFSS (High frequency simulation software).The Hardware Results are checked on the VNA (Vector Network Analyser). The return loss obtained is above -20dB.*

Key Words: Bandwidth Enhancement, Electromagnetic coupling, Harmonic Suppression, λ/4 resonator

1. INTRODUCTION

In Modern communication system, Microstrip antennas are much popular due to its features like low cost, light weight, easy to install, low profile and also easy to integrate with the other devices such as filters, oscillators, amplifiers etc. These characteristics of microstrip antenna make them suitable for many applications like in radar systems, satellite communications, military applications, mobile communications, WLAN; Wimax etc [1-3].In spite of having such advantages, traditional Microstrip antenna suffers from narrow bandwidth and the spurious radiations that decrease the system efficiency. And so the antenna becomes unsuitable for the wide band applications. Many researchers have been investigating in this area to increase the bandwidth [4] and reduce the harmonic suppression [12].

To enhance the bandwidth many different feeding techniques have been used such as proximity coupling feed, aperture coupling feed, stacked patch configuration [5-6]. In these techniques, the structure of antenna is multilayer and a patch is fed through a non-contacting fed network. But due to this, the size of the antenna becomes larger. The substrate becomes thicker. It is challenging to employ the patch and the feeding network on a single layer using a thin substrate.

So another method was then employed by cutting the different shapes slots in the radiating patch such as 'U', 'E', 'Ψ' shaped [7,8]. But again in this type of antenna, the air or the foam material has to be used and again the size of the antenna increases. So to overcome with this problem, an impedance matching network is formed using non- resonating resonators. In this, a composite resonator and a half wavelength λ/2 resonator are employed as a non-resonating element to increase the bandwidth [9-11].

In this paper, along with the bandwidth enhancement we have also employed an antenna structure such that it eliminates the harmonic radiation. Many researchers have employed the techniques to reduce the harmonic radiations. Basically, harmonic radiations are reduced by using the filters [12]. But then the size of the antenna increases. So the researchers employed the different techniques like using the electromagnetic band gap structure, compact resonant cell and defected ground structure [13-15].But due to these, the front to back ratio degrades.

In the proposed antenna, a patch is capacitively fed using a coupling gap. A pair of a λ/4 resonator is placed in parallel with the radiating patch. This increases the bandwidth of the antenna with a single layer using a thin substrate. Use of the shorting pin is done to combine the two λ/4 resonators. Also the high frequency harmonic radiations are suppressed.

2. METHODOLOGY

In the proposed antenna design, the radiating patch is placed in parallel with the pair of a λ/4 resonator. The length and the width of the radiating patch is denoted as 'L_p' and 'W_p' respectively as shown in the fig: 1 and the length and width of λ/4 resonator are denoted as 'L_r' and 'W_r' respectively.

A shorting pin is used to combine the two λ/4 resonators. The shorting pin connects the patch and the ground. The radius of the shorting pin is denoted by 'r'. Also the distance between the radiating patch and pair of the resonators is denoted by distance'd'. By adjusting the radius 'r' and the distance'd', we have achieved maximum wide band.

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A Fast and Optimized Architecture to Perform Multi-Bit Permutation Operation

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Abstract
The advanced bit processing operations implemented in the microprocessors and microcontrollers very inefficient. Normally programming techniques are used to emulate the complex bit-related operations. The bit manipulation functions are every now and then required in the areas that are eventually becoming very important. This paper is proposing a techniques which can directly support these bit operations in the form of multimedia shifter unit that can implement standard shifter operations in microprocessors and controllers. The design of the proposed shifter unit is based on the butterfly and inverse butterfly circuits. We show how the proposed design for new shiftes can implement the standard multi-bit scatter and deposit functions found in some processors. The technique proposed in this paper for performing the two operations is based on only Mux. The design of Shifter-Permute functional unit is very challenging work towards its power consumption, speed and area. We have implemented 8-bit Shift-Permute functional unit for bit manipulation and have analyzed the proposed design with the existing design in terms of power consumption, speed and area. Here the circuits are implemented and analyzed by using VHDL and is synthesized by using Xilinx ISE and the targeted device used is Vertex 4 FPGA xc4vlx15-12-sf363 and the same is reflected in the mathematical model purposed for each circuit.

Keywords
Control Unit, Data Reversal, Deposit, Extract, Multiplexer, VHDL.

Introduction

Todays general purpose processors are designed with special instructions for multimedia applications [1]. They are provided with larger sets of multimedia instructions as compared to the earlier generation processors. Consequently, providing efficient multimedia hardware has become an important design task.[12] The multi-bit scatter and gather operations for microprocessors and microcontrollers have not been considered and implemented thoroughly as integer and floating-point arithmetic and data transfer operations. The design of the microprocessors is basically around the processing of words. This is the main reason that bit-level operations are typically not as well supported by current word-oriented microprocessors and microcontrollers.[11] AND, OR, XOR and NOT are the basic bit-oriented logical operations implemented by the Arithmetic Logic Unit (ALU), which is a very important functional unit of a controller or a processor. The very regular operations like shift and rotate where all bits in an operand change their place by the same value, are typically supported by a separate shifter functional unit.[3] [4] [9]

The emerging applications, like biometrics, imaging and cryptography need advanced multi-bit manipulation operations. These bit-manipulation operations can be implemented in a single circuit using only multiplexers or demultiplexers or circuit including both.

Parallel scatter operation can be performed only with the butterfly network and that parallel gather operation can be performed only with the inverse butterfly network.[2][11]

1. Parallel Deposit [11]

This design circuit is explained by Yedidya[11]. The structure of the butterfly network is shown in Figure 1. The rightmost bits from the source register are scattered in the destination register according to a mask bits in the mask register. The i-bit network consists of log(i) stages. Each stage is designed using i/2 two-input multiplexer, for a total of i×log(i) multiplexers as shown in figure 1. In the n^{th} stage, the paired input bits to a switch are i/2n positions apart for the butterfly network and 2n–1 positions apart for the inverse butterfly network. A switch either passes through or swaps its inputs based on the value of a control bit. Thus, the operation requires i/2 × log(i) control bits.

Control bits for 8-bit input, for each stage are calculated as follows:

1st Stage:

- The mask bits are divided in two parts, L and R, each 4-bits.
- Number of 1's in the R are counted i.e. from I_3 to I_0= count.
- Left rotate and complement (LROTC) of '0000' is done depending on the value of count.
- This generates the control bits= S_{03} S_{02} S_{01} S_{00}

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Comparative Analysis of Planar Acoustic MVDR Beamformer

Kirtimalini Chaudhari, *Student Member, IEEE,* Mukul Sutaone, and Prashant Bartakke

Abstract—In this paper an ambiance invariant, data length invariant, real time experimental set up for testing Minimum Variance Distortionless Response (MVDR) beamformer under noisy reverberant environment is presented. To the best of our knowledge, for the first time an attempt is made to deploy MVDR beamforming algorithm on planar topologies, viz. rectangular and circular array. The sound source is localized using Time Delay of Arrival (TDOA) method. We present comparison between analytical performance of MVDR beamformer having up to 12 microphones in the array for reported topologies. An experimental investigation of MVDR beamformer on a dedicated hardware for a greater number of microphones in an array is performed. We show that using MVDR beamformer, in reverberant environment, the noise suppression up to 15 to 16 dB can be achieved using 5 to 9 microphones in a linear array.

Keywords—Audio Beamforming, MVDR, Planar topologies, Audio Signal Processing.

I. Introduction

NOW a days arrays are becoming popular for acquisition of audio signals transmitted by sources located at distinct locations. Signal processing technique that strengthens the desired signal based on the directional information is known as Beamforming. Beamformers find applications in wireless networking [1], radio telescopes [2]. In acoustic signal processing beamformers are extensively used for source localization [3], automatic speech recognition [4], hearing aid applications [5], [6], noise and echo cancellation [7] and source separation [8]. Array designs are primarily focused towards optimizing one of the narrow-band measures like signal to noise ratio (SNR), white noise gain (WNG) [9], array gain, beampattern, directivity factor (DF) [10].

Many classical beamformers such as Delay and Sum (DS) beamformer, sub-array beamformer are popularly used depending upon directivity patterns and array gain [11]. Delay and sum is the simplest beamformer derived by maximizing WNG subject to distortionless constraint on steering vector. However it has a narrow beamwidth. Subarray beamformers are broadband beamformers and give frequency invariant response.

Adaptive beamformers adapt dynamically to maximize one of the parameter such as SNR by strengthening the signal power [12] and suppressing the noise [13]. Cox et al proposed an algorithm for robust adaptive beamformer by adding quadratic inequality constraint on array gain [14]. One of the most popular and most explored beamformer is Capon beamformer also known as Minimum Variance Distortionless Response (MVDR). Many modified versions of MVDR such as MMSE MVDR [15], eMVDR [16], generalized sideband cancellation (GSC) beamformer [17] are proposed in literature [18]. Performance of MVDR in the presence of estimation error [19] and different types of noise is studied in detail [20] and in [21]. Superdirective beamformers maximize either the directivity or the array gain [22]–[25].

Numerous uniform and non uniform geometries are proposed in literature with the objective to obtain maximum DF, provide more antenna gain and better unwanted signal suppression. Simplest array geometry is a linear geometry.Though linear arrays are simple in implementation, they are large in size and do not have three dimensional spacial resolution. Many other planar topologies like rectangular [26], circular [27]–[29] and non planar topologies like spherical [30]–[33] and spiral [34] have been proposed. Ioannides et al have discussed analysis and implementation of planar uniform rectangular and circular geometries.

Microphone arrays are indispensable while working on localization of audio sources. Different localization techniques based on spectral estimation, maximum steered response of beamformer or time delay estimation in microphone arrays are discussed in literature [35], [36]. Recently many algorithms for sound source localization using machine learning methods are proposed [37]–[39]. TDOA estimation using different types of arrays under variety of environmental conditions such as indoor, outdoor, echoic, reverberent, noisy [40] and [41] are widely discussed.

So far, several topologies are proposed for different types of beamformers. MVDR beamformer is explored in detail too. Although lots of theoretical analysis is carried out in the literature, the measured performance differs from theoretical estimates, especially in reverberant environment. Reducing effect of noise for robust performance of beamformer is a big challenge. Majority of the commercial beamformers use limited number of microphones in the array as the performance of beamformer degrades drastically with increasing number of microphones in real life scenario. We have designed and developed an ambiance invariant, high resolution experimental setup to test the performance of beamformer. As far as our knowledge goes, this is the first of its kind attempt to deploy MVDR beamforming algorithm for planar topologies viz Uniform Rectangular Array (URA) and Uniform Circular Array (UCA). Their performance is analyzed for the ability to suppress undesired signal and compared with conventional Uniform Linear Array (ULA). Further, TDOA estimation-based localization is implemented.

The paper is organized as follows: Section II presents brief overview of different topologies of array. MVDR Beamformer

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Investigation of host-guest complexation of the ternary model: *p*-Sulfonatothiacalix[4]arene-fluorescein-M^{2+}

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ABSTRACT

In comparison to traditional calyx[4]arene, thiacalix[4]arene is unique due to its bridging S-atoms. Therefore, functionalized *p*-sulfonato thiacalix[4]arene has been used for the detection of some transition metal ions. The inclusion behavior between the important water soluble *p*-sulfonato thiacalix[4]arene with fluorescein and M^{2+} (Co^{2+}, Ni^{2+}, Cu^{2+}, Zn^{2+}) ions has been studied using a spectrofluorometric method. ^1H NMR, 2D NMR and IR spectra also supported the complexation. The complex stability follows the order $Cu^{2+} > Zn^{2+} > Co^{2+} > Ni^{2+}$, which is supported by the Irving-Williams series. The combined results demonstrate the cooperative interaction of the M^{2+} ions with *p*-sulfonato thiacalix[4]arene and this is further supported by a molecular docking study.

1. Introduction

Calixarenes are cyclic oligomers composed of phenolic units having well defined cavities which are able to encapsulate various guest species. Among all the types of calixarenes, thiacalix[4]arene represents a unique macrocyclic host in which all four methylene bonds. The sulfur bridging results in electrical and structural characteristics which are quite different from those of the analogous calixarenes with methylene bridges [1]. Our aim was to study the supramolecular behaviour of this class of host with an organic guest molecule, which provides a platform to study non-covalent interactions of biological systems [2].

For our research, we have selected thiacalix[4]arene because thiacalix[4]arene is more attractive than calix[4]arene due to i) its bigger ring size by virtue of the longer C—S bond length as compared to the C—C bond; ii) weaker intramolecular hydrogen bonding to its lower rim due to the enlarged framework of the thiacalix [*n*]arene; iii) the ring bridges containing sulfur atoms may act cooperatively with the phenolic oxygen for the binding of metal ions [3].

Hosseini et al. [4] reported the first X-ray crystal structure of thiacalix[4]arene and established that thiacalix[4]arene is in the cone conformation. Chemical modifications of the lower and upper rim of thiacalix[4]arenes are similar to that of calix[4]arenes, but nificantly change the reactivity pattern of thiacalix[4]arenes as compared to calix[4]arenes.

p-Sulfonatothiacalix[4]arenes are fairly soluble in water and therefore have potential for application in biological systems. Because of the presence of the sulfur bridges (the sulfur atoms possess lone pairs of electrons), thiacalixarene impart many interesting features compared to conventional calixarenes, particularly for the recognition of soft transition metal ions. It is important to develop systems that form and display stable associations as well as binding properties in aqueous solution [5–8]. Many researchers have studied the behaviour of thiacalix[4]arene with transition metal ions in the solid state.

To coordinate with particular metal ions, *p*-sulfonatothiacalix [4]arene acts as a polydentate ligand via different coordination modes. The complexes between Cu-phen (1,10-phenanthroline) and *p*-sulfonatothiacalix[4]arene are assembled into three dimen-

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REGULAR ARTICLE

The investigation of cooperative binding between *p*-sulfonatocalix[6]arene and fluorescein with transition metal ions by spectrometrically

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Abstract. The ternary complexes are formed by self-assembly through cooperative hydrogen bonding between *p*-SCX6-FL and M^{2+} through water molecule which is reinforced by columbic and electrostatic interactions. The binding efficiency of Cu^{2+} and Zn^{2+} is observed at a greater extent than Co^{2+} and Ni^{2+}. Furthermore, the kinetic study of *p*-SCX6-FL-Cu^{2+} and Zn^{2+} reveals that the process of complexation is slower than the binary system (FL+*p*-SCX6).

Keywords. *p*-sulfonatocalix[6]arene; ternary system; cooperative binding.

1. Introduction

The characterizing aspect of supramolecular chemistry is carefully designed synthetic structures (hosts) recognize target molecules (guests) and form a supramolecular complex through noncovalent interactions.[1] In the last few years, the inclusion complexation and molecular recognition are of huge interest in host-guest chemistry.[2] In this field, cyclodextrins (CDs),[3] cucurbiturils (CBs)[4] and calixarenes (CAs)[5] as three most active synthetic receptors have been extensively studied. In conniving a suitable host, you have to consider parameters like host size, charge and character of the donor atom, according to the properties of target molecules. The calixarene chemistry is a well-established field within the supramolecular chemistry.[6,7] Sulfonatocalix[n]arene (n = 4, 5, 6, 8), a well-known kind of water-soluble calixarene derivatives have been attracting increasing attention in supramolecular chemistry and coordination chemistry. As compared to *p*-sulfonatocalix[4]arene, the study of *p*-sulfonatocalix[6]arene in the solid state and solution chemistry is less well developed.[8,9] The cations for fluorescent sensors have constantly established their potential in a variety of fields, such as environmental sensors, biological probes, food safety, etc.[10–12] Calixarenes are widely used in the field of ion-selective electrodes sensors,[13] optical sensors,[14] self-assembly,[15] catalysis,[16] drug discovery[6] and as molecular recognition devices for solid-phase, modifiers and as the stationary phase. The applications of these studies of metal complexes are required to design sensors for detection and to determine toxic metal ions, and their removal to protect our environment. The application of calixarene metal complexes in the elucidation of enzymatic processes is worth noting.[17]

Water-soluble calixarene-dye complexation study is well known because of its cavity size, hydrophobic

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Synthesis and biological activity of 7-(2-(1*H*-1,2,4-triazol-1-yl)ethoxy)-4-(styryl/4-substituted styryl)-2*H*-chromen-2-one

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Incorporation of other hetero-compounds to parent coumarin increases its effectiveness towards its bioactivity. In view of this finding we have synthesized coumarin triazole derivatives. The key synthon used for this reaction pathway are 7-hydroxy-4-methyl-2*H*-chromen-2-one. This substituted coumarin has been refluxed with 1-bromo-2-chloroethane in presence of anhydrous K_2CO_3 to afford 7-(2-chloroethoxy)-4-methyl-2*H*-chromen-2-one, which has been condensed with triazole to yield 4-methyl coumarin triazole derivative by optimising solvent/base pair. 4-Methyl group of coumarin triazole derivative has been condensed with aromatic aldehydes to afford 7-(2-(1*H*-1,2,4-triazol-1-yl) ethoxy)-4-(styryl/4-substituted styryl)-2*H*-chromen-2-one **7a-e**. All the synthesized products are characterized using IR and, ^{1}H, ^{13}C NMR, mass spectroscopy and elemental analysis. Final synthesized compounds **7a-e** have been evaluated for their anti-bacterial and anti-fungal activity.

Keywords: Coumarin triazole, anti-bacterial, anti-fungal activities, solvent/base pair

2*H*-1-Benzopyran-2-ones as an elite class of naturally occurring compounds that possess promising therapeutic perspective due to diversity in their structural complication. It also belongs to the flavonoid class of plants, secondary metabolites, natural and synthetic origin, such as substituted coumarins to polysubstituted polycyclic/fused coumarins[1,2]. Warfarin is a 4-hydroxy coumarin moiety. Warfarin has been isolated from woodruff as well as from lavender and used to prevent clotting of blood in the veins, lungs or heart[3]. Hydroxycoumarins are known to be powerful chain-breaking anticoagulants and anti-oxidants which can prevent free radical injury by scavenging reactive oxygen species[4]. Methylcoumarin derivatives, have demonstrated growth-inhibitory activity against two human tumour cell lines, breast carcinoma MCF-7 and hepatocellular carcinoma HePG-2 [5,6]. Also, it has been reported as anti-proliferative activity in prostate cancer, malignant melanoma and metastatic renal cell carcinoma in clinical trials[5].

Some classes of triazole compounds are now available in the market or in the final stage of clinical trials[7]. Because of broad spectrum of triazole and improved safety profile, triazoles play a principal role in the treatment of systemic fungal infections. But the widespread use of these compounds has led to the development of resistance in recent years. As a consequence, development of more effective antifungal azoles with fewer adverse effects, is a main area of antifungal drug research[8]. 1,2,4-Triazole moieties have exhibited antibacterial[9], antifungal[10], antioxidant[11], antituberculosis, anti-HIV and antiviral[12] activities. Substituted coumarins are known to be biologically versatile compounds possessing several biological properties[13,14]. It has been reported that coumarin compounds bearing other heterocyclic systems possess a number of interesting biological activities such as anti-tumor[5], antimicrobial[15] and anticancer[16].

The insertion of other heterocyclic moiety either as substituent group or as a fused component into parent coumarin modifies the property of parent coumarin and converts it into a more useful product[17]. In light of these findings, we efficiently synthesized substituted coumarin and successfully introduce 1,2,4-triazol moiety in coumarin scaffold afford coumarin triazole derivatives. The resulting compounds have been analysed for their antimicrobial activitiy.

Results and Discusssion

Coumarin constitutes one of the major class of naturally occurring compounds and attention in its chemistry continues unabated because of its usefulness

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Research Article

SYNTHESIS AND CHARACTERIZATION OF OPTIMIZED NANO-EMULGEL MICELLES AS A VEHICLE OF PLANT EXTRACTED CURCUMIN: DRUG RELEASE AND *IN VITRO* STUDY

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ABSTRACT

The curcumin is naturally occurring antimicrobial, anticancer, poorly water soluble drug. The nano-emulsion based gel containing curcumin was prepared with view of its enhanced antibacterial activity and drug release kinetics using membrane dialysis method. The solubility study was useful to optimize emulsion system. Oleic acid was optimized as an oil phase while Span 20 and PEG 400 were optimized as surfactants and co-surfactant respectively. The surfactants and co-surfactants are mixed in different weight ratios (1:1, 1:2, 1:3, 1:4, 4:1, 3:1 and 2:1 respectively) to optimize proportion of surfactants, co-surfactant and oil phase. The pseudo ternary phase diagrams were developed by using different weight ratios of oleic acid (oil phase) and Smix (mixture of surfactant and co-surfactant) mixed in different weight ratios ranging from 1:9 to 9:1. The optimized nano-emulsions were selected to form nano-emulgel. The agarose were used as a gel forming agent. The emulsion region of pseudo ternary phase diagrams was considered to optimize emulsion. The formulated optimum emulsion was used to load curcumin. The probe sonicator was used to maintain nanometer size ofself-assemble micelle. The nano-emulgel formulations of curcumin were used to study its potent antibacterial activity. The drug release study was done by using membrane dialysis method. The Nano-gel form is optimized for transdermal administration of drug.

Keywords: Curcumin, Nano-emulsion, Nano-emulsion gel, Micelles and Drug release study.

INTRODUCTION

Curcumin is naturally occurring polyphenolic compound use as a active pharmaceutical ingredient in the world. For the topical drug delivery, poor bioavailability of drug is the major cause of high cost of therapy and decreases its potential. In order to overcome such limitations nano-emulgel formulation is use. This technology helps for penetration of drug through intercellular pathway.[1] Metal nanoparticles also show catalytic activities during various reactions.[2]

The nano-emulgel (NEG) formulation with homogeneous distribution and near about same micelle size, provides some advantages for drug delivery of pharmaceutical agents. NEG has ability to dissolve lipophilic drugs, increases penetration in intercellular pathway and extend the release of lipophilic and hydrophilic drugs. Moreover, it creates complete dispersion into skin as well as better skin hydration in cosmetic products.[3] (The transdermal route of administration).The curcumin is aromatic polyphenolic compound with potent antimicrobial as well as anticancer activity. It is also use in skin infections such as fungal and bacterial infections. The objective of the present study is enhancement in ability of curcumin to penetrate membrane for better drug delivery through nano-emulgel

Initial Coefficient Inequalities for Some Subclasses of Analytic Bi-univalent Functions

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Abstract : In the present paper, we introduce two interesting subclasses $\chi_\Sigma(\beta)$ and χ_Σ^α of the class of bi-univalent functions defined on the open unit disk $\mathbb{U} = \{z : z \in \mathbb{C},\ |z| < 1\}$ and obtain estimates on the initial coefficients $|a_2|$ and $|a_3|$ for the functions belong to these subclasses.

Keywords – **Analytic function, Univalent function, Bi-univalent function, Coefficient estimate.**

I. Introduction

Let A denote the class of all functions of the form:

$$f(z) = z + \sum_{k=2}^{\infty} a_k z^k \tag{1.1}$$

which are analytic in the open unit disk $\mathbb{U} = \{z : z \in \mathbb{C},\ |z| < 1\}$. Further, let S denotes the subclass of A consisting of the functions which are analytic as well as univalent in $\mathbb{U}$. Clearly, due to the Koebe one quarter theorem (see, [7]), every function $f(z) \in S$ has an inverse f^{-1} such that $f^{-1}(f(z)) = z, (z \in \mathbb{U})$ and $f(f^{-1}(w)) = w, (|w| < r_0(f), r_0(f) \geq 1/4)$. In fact, some simple calculations gives:

$$g(w) = f^{-1}(w) = w - a_2 w^2 + (2a_2^2 - a_3)w^3 - (5a_2^3 - 5a_2 a_3 + a_4)w^4 + \cdots. \tag{1.2}$$

Let $\Sigma = \{f \in S :$ both f and f^{-1} are univalent in $\mathbb{U}\}$ denote the class of bi-univalent functions in $\mathbb{U}$. For more examples and information related to the class Σ, see the work of Srivastava et al. [19] (see also [2, 21]). Recently many researchers (viz. [1, 4–6, 8, 9, 11, 13–15, 17, 18, 20]) obtained initial coefficient estimates for the functions in various subclasses of bi-univalent functions.

In 1967, Lewin [10] investigated the class Σ and proved that $|a_2| < 1.51$; in 1969, Netanyahu [12] showed that $max_{f\in\Sigma}|a_2| = 4/3$; and in 1979, Brannan and Clunie [3] conjectured that $|a_2| \leq \sqrt{2}$. But still the problem of coefficient estimate for $|a_n|, (n = 3, 4, \cdots)$ is an open problem.

The object of the present paper is to introduce two new subclasses of bi-univalent function class Σ and obtain estimates on the initial coefficients $|a_2|$ and $|a_3|$ for the functions belong to these subclasses. We need the following lemma (see [16]) to prove our main results.

Lemma 1.1: If $h(z) \in \mathcal{P}$, the class of functions analytic in $\mathbb{U}$ with positive real part, given by:

$$h(z) = 1 + c_1 z + c_2 z^2 + c_3 z^3 + \cdots, \quad (z \in \mathbb{U});$$

then $|c_n| \leq 2$ for each $n \in \mathbb{N}$.

II. Main Results

Definition 2.1: A function $f(z) \in \Sigma$ given by (1.1) is said to be in the class $\chi_\Sigma(\beta)$ if the following conditions are satisfied:

$$\Re\left[\frac{z^3 f''(z)}{(f(z))^2} + 1\right] > \beta \qquad (z \in \mathbb{U})$$

and

$$\Re\left[\frac{w^3 g''(w)}{(g(w))^2} + 1\right] > \beta \qquad (w \in \mathbb{U})$$

where $0 \leq \beta < 1$ and the function $g = f^{-1}$ is given by (1.2).

Definition 2.2: A function $f(z) \in \Sigma$ given by (1.1) is said to be in the class χ_Σ^α if the following conditions are satisfied:

$$\left|arg\left(\frac{z^3 f''(z)}{(f(z))^2} + 1\right)\right| < \frac{\alpha\pi}{2} \qquad (z \in \mathbb{U})$$

and

$$\left|arg\left(\frac{w^3 g''(w)}{(g(w))^2} + 1\right)\right| < \frac{\alpha\pi}{2} \qquad (w \in \mathbb{U})$$

where $0 < \alpha \leq 1$ and the function $g = f^{-1}$ is given by (1.2).

Theorem 2.3: Let the function $f(z) \in \chi_\Sigma(\beta)$, $(0 \leq \beta < 1)$ be of the form (1.1). Then

$$|a_2| \leq (1 - \beta)$$

and

$$|a_3| \leq (1 - \beta).$$

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 19-20

Performance of Additives Concerning Synergistic Effect in Lube Oil

Pramod S. Kathamore, Bhanudas D. Bachchhav, Harijan H. Bagchi

Abstract*: Lubricating oils containing ester, gaining more importance due to their friction reducing ability. Screening the performance of lubricating oils prior to field test is of most significance for the new lubricant formulations. In this endeavor, six lubricating blends were formulated having variable concentration of additives (sulfur and ester) in mineral oil and screened for their performance using four-ball tribo-tester. The formulated blends were evaluated for their extreme pressure and anti-wear characteristics as per ASTM standards. Tests were conducted on DUCOM TR- 30L four-ball tester and wear scar diameter were measured on an optical microscope.Compatibility and synergy of additives have been discussed on the basis of various parameters such as anti-wear scar diameter, mean scar diameter (just below weld load), mean scar diameter (at last non-seizure load), weld load and load wear index. The findings of this study demonstrate that ester along-with sulfur not only boost anti-wear properties but also enhance load carrying capacity of oil. An addition of sulfur beyond 2 % may not yield any significant improvement of tribo-characteristics of these oils.This paper is highlighting the synergistic effect of additives to render it as suitable lubricant for metal working applications. This paper also suggested an optimum concentration of an additive for its suitability for anti-wear and/(or) extreme-pressure properties.

***Index Terms*: Anti-wear, Extreme pressure additives, Weld load, Load wear index**

I. INTRODUCTION

Performance-based rating of mineral oils used in different metal cutting and forming operations assume a lot of significance. In almost every metal cutting operation when lube oil is present, a protective boundary film manages to get developed between the surfaces and carry part of the load resulting in wear resistance of mating surface. Tribological performances of lube oil are very much dependent on its formulation, in particular addition of appropriate additives. The mechanism by which it performs is varied from process to process, material to material, parameters governing the process and also on the integrity of contacting surfaces. Under such conditions, primary screening and evaluation of lube oil in order to study synergistic effect (anti-wear and EP characteristics) of additives prior to field testing needs careful considerations. Anti-wear (AW) and Extreme-Pressure (EP) additives have significantly proved their role in the majority of mineral based as well as vegetable based metalworking processes [1-4, 7-10]. These additives formed a protective layer on the mating surfaces and carry the load.The performance metal forming oils [7-10], cutting fluids [7], deep drawing oils (Bachchhav *et al.,* 2011, 2012, 2014), rolling oils [3-5], wire drawing lubricants [2], engine oils [11-12], have been evaluated using four-ball test tribometer. Recently, a tribological performance of vegetable-based lubricants has been investigated using ball-on-flat reciprocating tribometer [1]. Rheological properties of lubricants do not play any significant role in reducing friction and wear in metalworking processes, however, AW or EP additives have a strong effect on it, helping to reduce wear and ultimately scuffing and seizure of contacting surfaces [4, 15]. The most commonly used EP additives are sulfur, chlorine and phosphorous-based compounds, used either singly or combination of those compounds. Neville, *et al.*,[13]studied and evaluated synergistic effect of various additives in lube oil and compatibility with lubricant surfaces. Rajendiran*et al.*,[14]confirmed that substantial reduction in friction and wear can be achieved by blending with esters with minimum or no conventional additives. These additives work by reacting chemically with the interacting surfaces and form a protective tribo-film on them [4, 8-10]. The effect of type of additives and their concentration on lubrication performance need to be addressed for primary evaluation of lubricants, for application in the field.

This paper deals with screening the performance of formulated lubricants particularly for their Anti-Wear (AW) and Extreme Pressure (EP) properties following ASTM D2783 and ASTM D4172 standards. Frictional behavior of these lubricants have already been studies in detail by the authors [5]. This primary screening and performance-based rating will narrow down selection of lubricant types to enable the manufacturer or end user to undertake detail characterization of lubricants under a simulative type of test conditions in order to evaluate the suitability of lubricant for a particular metal working process, in relating to tribology.

II. MATERIALS AND METHODS

A. Lubricants

Since sulfur is not desirable additives now-a-days; as an alternate ester is being tried to reduce sulfur content in lubricant. Ester based oil formulation gaining more importance due to their friction reducing ability and inhibit chemically breakdown of ester by forming protective film. The lubricants formulated for this study contain 500 SN (Solvent Neutral) mineral based oil of kinematic viscosity 87.47 cSt. at 40^0 C and a

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Friction and Wear Characteristics of Rubber Resin-Bonded Metallic Brake Pad Materials

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Abstract*: This paper aims to present comparative study of friction and wear characteristics of non-asbestos rubber resin bonded metallic based brake pad material. Friction material was compression moulded and machined to a sample size. Their physical and mechanical properties were studied. Experiments were conducted using Pin-on-disc test set-up against EN31 disc. Coefficient of friction and wear was measured for metallic based brake materials at varying conditions of temperature, sliding velocity, pressure and sliding distance. When brake pads are in contact with brake disc, heat is generated hence thermal behaviour of metallic based brake material and its impact on friction and wear were studied. Experiments, based on Taguchi's analysis technique, using L_9 orthogonal array were performed. On the basis of experimental results and S/N ratio analyses, ranking of the parameters have been done. It was found that temperature (95.37 %) and sliding velocity (2.99 %) are most affecting parameters in friction, However temperature (82.96 %) and pressure (6.80) in wear. The elemental composition of metallic based brake material was measured by EDS technique. SEM micrographs of brake pad samples were tested at different magnifications. Further detailed studies are suggested to evaluate wear rate, stopping distance under simulative test conditions alternate to asbestos based brake pad material.

***Index Terms*: Asbestos-free, Metallic Brake Pad Materials, Friction and Wear, Pin-on-Disc Test, Taguchi Method**

I. INTRODUCTION

A brake pad / lining is the most important element of the automotive disc brake system. Brake linings are the sacrificial wearing elements and the primary determinants of frictional behavior, therefore brake pad materials should maintain a controlled friction coefficient, minimum wear and good thermal conductivity [1]-[2]. Asbestos based friction materials have been used over a century but presently being banned because of its health hazards. A lot of research is being carried out in developing eco-friendly brake pad materials having equally good mechanical, thermal and tribological properties to that of asbestos [3]-[4]. The friction material usually composed of binders, reinforcements, friction modifiers and fillers; however their composition keep changing with applications, technological developments and impending environmental impact. Development of asbestos-free friction materials from agro-waste, composites and with no copper and lead have been carried out [5]-[8]. Comparison of mechanical and physical properties of newly developed materials with other commercial brake pad materials and their performance evaluation was discussed. A preliminary investigation has been carried out to evaluate coefficient of friction and wear using pin-on-disc test set-up [9]-[11]. Morphological analysis of friction bands produced during braking operations, area covered by the friction layer on brake disc surface and correlation among temperature variation and morphological analysis were discussed [12]. Attempts have been made [13] to grade critical properties for a selection of brake pad materials amongst all by using Analytic Hierarchy Process (AHP) and found that friction coefficient, wear and thermal conductivity are most predominant. However, the analysis primarily was based on qualitative attributes only.In this paper, metallic based friction materials namely AF-22 were compression moulded and machined to a pin sample size. Their physical and mechanical properties were studied for comparison purpose. This paper highlights the investigations of frictional and wear characteristics of these materials in order to render it a suitable material for brake pad application through detailed quantitative analysis using Taguchi method [14].

II. AF-22 BRAKE PAD FRICTION MATERIAL

Friction material were procured from CO-EFF friction bands, India under the trade name AF-22 having density 2.12 g/cm^3, compressive strength 165 N/mm^2 and transverse bending strength 78 N/mm^2. AF-22 brake pad material made up of non-asbestos friction material, rubber resin bonded, metallic filler based. Brake friction material sample were crushed into the fine powder sample for energy dispersive spectroscopy (EDS) and scanning electron microscopy (SEM) analysis. When brakes applied at that time heat is generated and brake material heats, to study the thermal behavior of braking materials thermogravimetry analysis (TGA) used.

A. AF-22 Brake Pad Friction Materials

The elemental composition, as measured by EDS is reported in Table 1. Major elements found are C (Carbon), Si (Silicon), Ba (Barium), Sb (Antimony). It also includes elemental properties of Ca (Calcium) and Mo (Molybdenum) in AF-22 brake pad material sample.

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Frictional Characteristics of Brake Pad Materials Alternate to Asbestos

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Abstract: ***Nevertheless, asbestos though having ample physical and tribo-mechanical properties is being banned worldwide due to its health hazardousness. Most importantly, any material replacing asbestos should have comparable friction properties. This paper aims at comparative study of frictional characteristics of asbestos base and asbestos free brake pad materials. A total of three friction materials namely AF-22 (metallic based), CL-3003 (fine brass based) and DM-6 (asbestos based) were compressed and moulded into a sample. Experiments were performed using dedicated test set-up based on Pin-on-disc principle. Coefficient of friction was compared for three materials at different conditions of sliding velocity and pressure. Experiments were performed using Taguchi's L_{27} orthogonal array. Ranking of the parameters have been done based on experimental results and S/N ratio analysis. The elemental composition of materials was measured by EDS technique. Scanning electron micrographs of brake pad samples were tested at different magnifications. Further investigations to evaluate wear rate, stopping distance under simulative test conditions are suggested.***

Index Terms: ***Asbestos-free, Brake Pad Materials, Friction, Pin-on-Disc Test, Taguchi Method***

I. INTRODUCTION

A brake pad plays very important role in automotive braking system to decelerate the vehicle. The friction between brake pads and rotating disc/drum causes to stop the vehicle. In order to achieve this brake friction material should maintain a high coefficient of friction, good thermal conductivity and hardly any running wear. Asbestos based friction materials have been used since long are being banned because of its carcinogenic nature. Efforts are being endorsed in developing organic friction materials having equally good tribo-mechanical properties to that of asbestos [1-7]. The basic elements of friction material usually are binders, reinforcements, friction modifiers and fillers; however their composition are subjected to applications, technological developments and impending environmental impact. Development of alternate to asbestos friction materials from agro-waste [1, 4-5, 15] composites [8-9, 11] and with no copper alloys and lead [2-3] have been conceded. Evaluation of mechanical and physical properties of alternate to asbestos friction materials with other commercial brake pad materials and their performance evaluation was discussed [1-5]. Matteo *et. al.* investigated on the use of the pin-on-disc test to simulate off-brake friction and wear characteristics of friction materials [11, 14] and reciprocating sliding test set-up [18-19]. Morphological analysis [13] , correlation among temperature variation [16-17] , tribological evaluation of rubber resin bonded brake pad materials [19] were examined for its commercial applicability. In order to rank critical properties for a selection of brake pad materials amongst all, an Analytic Hierarchy Process (AHP) was used by Bachchhav *et. al.,* [7] and found that friction coefficient and thermal conductivity of material are most predominant properties considering qualitative attributes only; however further investigation is recommended considering quantitative variables.

In the present study, three friction materials namely AF-22 (metallic based), CL-3003 (fine brass based) and DM-6 (asbestos based) were considered for comparison of their tribological performance. In this paper the frictional characteristics of above materials were evaluated using pin-on-disc set up. Analysis of variance using Taguchi's technique was carried out in order to find suitability of a material for brake pad application.

II. FRICTION MATERIALS

A. Brake Pad Friction Material

Three friction materials were procured from CO-EFF friction bands, India under the trade names AF-22, CL-3003 and DM-6 with their mechanical and physical properties supplied in Table 1. AF-22 brake pad material made up of non-asbestos friction material, rubber resin bonded, metallic filler based. CL-3003 is made up of non-asbestos friction material with extremely high amount of organic and inorganic reinforcing fibre system, fine brass fibres, non-ferrous, organic binding system by special synthetic rubber modified resins plus NBR rubber. DM-6 is a commercially available asbestos fibre based brake pad material. It also includes organic binding system special formaldehyde resins used as binders. Brake friction material samples were crushed into the fine powder samples for energy dispersive spectroscopy (EDS) and scanning electron microscopy (SEM) analysis.

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BIO-BASED LUBRICANT SELECTION FOR METAL CUTTING OPERATIONS USING MADM TECHNIQUE

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ABSTRACT

Increased concerns about potential environmental hazards, due to mineral oil based lubricants foster the use of vegetable oil as base oil in various metal cutting operations. The selection of vegetable based oil that caters to the need for all metal cutting operations is a complex task. Selection of appropriate base oil for a specific operation depends on a number of diverse criteria or attributes. In this paper, nine attributes such as viscosity index, flash point, pour point, oxidation stability, availability, cost, anti-wear, extreme pressure properties, coefficient of friction and fourteen alternative vegetable base oils were considered for decision making. The preference index for ranking of base oil is computed by using MADM technique, and it was suggested that palm oil is more significant base oil to be used for further formulation. In this paper, subjective as well as objective weights are compared. Subjective preferences are evaluated using AHP and integrated weights are also calculated. However, castor oil, jatropha oil, rapeseed oil and coconut oil can also be strived with an appropriate set of additives, in order to render it a suitable lubricant for specific metal cutting operation.

KEYWORDS: Analytical Hierarchy Process (AHP), Multi Attribute Decision Making (MADM), Vegetable Oil & Metal Cutting

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Original Article

1. INTRODUCTION

The mineral based oils, hardly meet the requirement of metal cutting operations without the support of anti-wear and extreme-pressure additives. Besides, being environment friendly, vegetable based lubricants have inherent lubricity, polar nature, high viscosity index and biodegradability. Lubrication plays a very important role during the metal cutting process. Tribology consists of boundary friction, which is associated with all metal cutting processes. At boundary lubrication zone, the oil film is very thin, so there are possibilities of asperities contact. To create effective boundary lubricant, it is very essential to know various tribological behavior of base oil. Mineral based metal cutting oils are found to be toxic and non-biodegradable in nature. The natural consumption of resources and wastage, generated after cutting with mineral-based oil are very difficult to degrade.

An ever increasing issue of biodegradability and global energy crises fosters the need of replacing mineral based oils by the bio-lubricants [1–2, 6].The physical and chemical properties of the base oil also affects the tool life, surface finish, force and power requirement, disposability into the environment, toxicity of lubricant etc. [15].

Investigations have been carried out by various researches in formulation and evaluation of tribo-mechanical properties of vegetable based lubricating oils such as sunflower oil [3-4], coconut oil [5], cotton seed oil [7], neem and castor oil [8], mustard seeds oil [9], Jatropha-based oil [10], palm oil [11] for various metal cutting operations. These

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EXPERIMENTAL STUDY OF HYDROCARBON R290 IN WATER COOLER REFRIGERATION SYSTEM

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ABSTRACT

Environment friendly hydrocarbon R290 is one of the options for the next generation refrigeration systems. In warm climatic countries, water cooler is the widely used refrigeration application and R22 is the predominantly used refrigerant in these refrigeration systems. In accordance with international agreements, use of refrigerant R22 is to be stopped on urgent basis because of its environmental concerns, ozone depletion and global warming. This paper presents an experimental study on the performance of laboratory water cooler charged with environment friendly refrigerant R290. A laboratory water cooler of nominal cooling capacity 1.5 kW is developed. Pull down tests and energy consumption tests at condensing temperatures of 38°C, 43°C, and 48°C is conducted as per Indian standard IS1425 (Part 1): 2001. Performance parameters such as pull-down time, pressure ratio, discharge gas temperature, average compressor energy consumption, energy consumption over a period of 24 hours, coefficient of performance and performance parameter of the water cooler refrigeration system are measured. Observed performance parameters also proved the compatibility of mineral oil with refrigerant R290. The overall performance of the developed water cooler suggests refrigerant R290 as a better long- term alternative refrigerant for water cooler applications.

Keywords: *Hydrocarbon, R290, Flammable Refrigerant, Water Cooler*

INTRODUCTION

Refrigeration technology has forever played an important role in improving the human standard of living. Inventions such as the refrigerator and air-conditioner have become a necessity for food preservation and comfort living. However, rapid development of the refrigeration industry over the years has contributed significantly towards the environmental problems of global warming and climate change [1]. Specifically, widely used refrigerant for last fifty years, chlorofluorocarbon (CFC) and hydro chlorofluorocarbon (HCFC) are majorly responsible for environmental degradation. The whole world is in the process of controlling the use of environmentally unfriendly CFC, HCFC, and hydro fluorocarbon (HFC) refrigerants. International agreements, Montreal and Kyoto protocols and their subsequent amendments have been effectively implemented for the sustainable development of the refrigeration industry [7]. India became a party to the Montreal protocol in 1992 and efforts have been put at the national level to phase out CFCs and HCFCs as prescribed by the Montreal protocol. The Government of India also has prepared a detailed roadmap in 1993 for phasing out of HCFC refrigerants as per its national Strategy. As per the amendment in Ozone Depleting Substance Regulations (2014), manufacturers of refrigeration and air conditioning appliances are expected to phase out HCFCs by January 2025. In view of this, there is a renewed strategy of use of natural hydrocarbon R290 (Propane) as a replacement to pollutant synthetic refrigerants.

In India, the water cooler is one of the widely used applications of the refrigeration and R22 is the predominantly used refrigerant in water cooler refrigeration systems. R22 is an ozone-depleting substance with higher global warming potential of 1700, whereas R290 is a non-ozone depleting substance with a very negligible value of global warming potential (GWP) (< 20) [2, 3]. Refrigerant R290 possesses excellent thermo-physical properties such as high latent heat ofevaporation, lower density and viscosity and higher values of thermal conductivity and specific heat. Flammability is the only concern because of which it was neglected for many years. With the need of environment-friendly refrigerant, in last couple of years, there is growing interest in the use of R290 in different refrigeration and air conditioning applications. By taking proper care with the support of technological

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TECHNICAL PAPER

Performance evaluation of EN24 for planetary gear transmission of CNC bending machine

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Abstract
The aim of this research paper is to simulate the process of gear meshing in the planetary gear system (PGT) of CNC bending machine to evaluate the friction coefficient, friction force, and wear rate of EN24 material. EN series of steel is typically used for gear manufacturing. The PGT is capable of transmitting huge torque and provides high performance along with huge reduction ratio. It is used on a grand scale in many applications. Effective meshing is observed at the sun and planet gear interface only. Tests are performed on a cylinder-on-disk machine with varying loads from 60 to 110 N for time duration of 5 min at 1250 rpm. The outcomes elucidate that the friction coefficient fluctuates with time and normal load. From experimental inspection, it is observed that the friction coefficient increases with rubbing time and after that remains constant for a rest period. From experimental investigation, it is observed that the friction coefficient and wear increase with an increase in normal load. It is observed that the presence of carbon content leads to fluctuation in wear rate. Wear measurement test was carried out for EN24 materials by rubbing different cylinders on EN-31 disk.

Keywords PGT (planetary gear transmission) · CNC bending machine · Gear meshing · Cylinder-on-disk machine · Friction coefficient · Wear rate

List of symbols

b	Half width of contact (mm)
P	Contact pressure (N/mm^2)
F	Applied force (N)
F_{eq}	Equivalent applied force (N)
L	Length of contact region (mm)
v	Poisson's ratio
E	Young's modulus (MPa)
z	Vertical compressed length at point of contact (mm)
σ	Principal compressive stress (N/mm^2)
τ	Principle shear stress (N/mm^2)
R	Radius of gear at the point of contact (mm)
τ_{li}	Shear stress of lubricant (N/mm^2)
μ	Dynamic viscosity (N s/mm^2)
n	Rotation speed of gear or disk (rpm)
du	Angular velocity (mm/s)
h	Lubricant film thickness (mm)
f	Friction coefficient
W	Friction force (N)
u	Kinematic viscosity (mm^2/s)
ρ	Density of oil (kg/mm^3)
ϕ	Pressure angle (°)
t	Time (s)

1 Introduction

The main purpose of this research work is to study the tribological behavior of gear steels used in planetary gear transmission system of CNC pipe bending machine. Research in tribology is important as it helps in increasing the plant efficiency, cost savings and also improved performance. EN24 is the key material within the industries for producing gears. There are different failure modes of gears. Wear shows challenges to the research and development department of the producing trade. Friction typically means the opposition motion between two surfaces slipping on one another. Friction is usually undesirable within the meshing

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ICAMMAS17

Study of Aerodynamic Drag of Sports Utility Vehicle by Experimental and Numerical Method

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Abstract

Aerodynamic styling of the vehicle is one of the promising technologies which can not only improve the fuel efficiency, but also ensure better stability and good handling characteristics of vehicles at higher speed especially on highways. The paper includes assessment of drag force (F_d) and drag coefficient (C_d) by the conventional wind tunnel method. The experimental calculations were performed using subsonic wind tunnel having a test section of 100cm x 30cm x 30 cm. An exact replica of a model of Sports Utility Vehicle (SUV) on reduced scale 1:32 was used to conduct and perform the experiment for calculating F_d and C_d. Three-dimensional (3D) computational analysis was carried out using Gambit as the preprocessing software and Fluent as the solver and post-processor. The comparison of computational approaches with experiment shows that the computed F_d agrees well with the experimental values over the entire range of air velocities.

Selection and/or Peer-review under responsibility of International Conference on Advances in Materials, Manufacturing and Applied Sciences.

Keywords: CFD, drag force, drag coefficient, aerodynamics

1. Introduction

Recently automobile fuel economy, emissions, and recycling have become an important social concern. At the mean time, automotive industry competition has become more brutal and automotive companies began to put more effort on advanced vehicle design. Engineers believe that the automobile should be affordable, yet appealing, safe, and inexpensive to drive. The well designed aerodynamic vehicle consumes not only less fuel in overcoming the drag exerted by air while running at higher speeds, but also offers good stability and handling [1].

Aerodynamic styling of a car is one of the most crucial aspects of car design-a highly complex Phenomenon [2], encompassing the task of an artful integration of advanced engineering and stylish aesthetics. A lot of emphasizing is laid on the aerodynamics [3] in car design as an aerodynamically well-designed car spends the least power in overcoming the drag exerted by air and hence exhibits higher performance- cruises faster and longer, that too less fuel.

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ORIGINAL CONTRIBUTION

Implementation of CFD–FSI Technique Coupled with Response Surface Optimization method for Analysis of Three-Lobe Hydrodynamic Journal Bearing

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Abstract In the work presented here, numerical simulations were carried out using computational fluid dynamics and fluid–structure interactions for three-lobe journal bearing. ANSYS Workbench® software was used for the study. The elastic deformations were also considered for the analysis. The fluid pressure forces and displacements were transferred through inbuilt transfer interface available in the software. The optimized journal bearing position was achieved using a response surface optimization technique. The methodology was validated by comparing numerical results obtained with experimental results available in the literature, and a good agreement was found. The proposed numerical method was implemented to study the pressure distribution in three-lobe journal bearing considered for study at three eccentricity ratios 0.25, 0.6 and 0.75 for various speeds ranging from 1000 to 4000 RPM. Preload factor of 0.5 was considered for the study. The results were compared with a set of experimental data obtained on a test rig developed by the authors.

Keywords Three-lobe bearing · Computational fluid dynamics · Fluid–structure interaction · Response surface analysis · Numerical analysis of hydrodynamic bearing

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List of symbols

C_b	Bearing clearance (m)
C_p	Lobe clearance or machined clearance (m)
D	Shaft diameter (m)
e	Eccentricity between shaft and bearing
h	Film thickness (m)
I	Unit tensor
L	Length of the bearing
O	Shaft center
O'	Bearing center
P	Static pressure (Pa)
R	Radius of the shaft (m)
t	Time
W	Load carrying capacity (N)
$[F_f]$	Fluid force matrix
$[F_s]$	Structural force matrix
$[M_f]$	Fluid mass matrix
$[M_s]$	Structural mass matrix
$[R]$	Coupling matrix
$\vec{F}$	External body force (N)
$\vec{v}$	Fluid velocity vector
Δh	Relative rigid displacement of the two bearing surfaces
δ	Preload factor
δ_E	Deformations due to elasticity
δ_T	Deformation due to thermal expansion
ε	Eccentricity ratio = e/C_b
θ	Angular coordinate (°)
θ_p	Angle from the +ve X-axis to the minimum film location for a pa
μ	Fluid viscosity (Pa s)
ρ	Fluid density (kg/m^3)
$\bar{\bar{\tau}}$	Stress tensor
ϕ	Attitude angle (°)
χ	Lobe angle
ω	Angular velocity (rad/s)

Tribological Parametric Influence of Dry Sintered Iron Bearings

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Abstract : The friction and wear of sintered bearing materials were studied under dry condition using a dedicated test rig. The materials tested were Fe based alloy and additives added in it through sintering process. The performances of coefficient of friction and wear were evaluated against process and manufacturing parameters. Parametric influence on tribo-characteristics have been evaluated under varying condition of running. Effect of additive concentration have been shown in case of MoS_2 and Zn-stearate impregnated bearings. A comparison of specific wear rate of bearings have been reported. Finally SEM micrographs have been taken to study the mechanism of tribo-process.

Keywords: Sintered bearing, friction and wear, process and manufacturing parameter, SEM micrograph

I. INTRODUCTION

Sintered bearings made with different combination of metals have been studied for some years now and their properties are becoming increasingly well known. They have been developed widely for application in many industrial areas because they have good formability and excellent properties of materials.[1, 2].Amsallem et al.[3] demonstrated low wear of Fe alloy sintered material at low speed and Gopinath et al.[4] have derived equations for the friction and wear of Fe alloy material. Bekir Sadik [5] concluded that metal based materials with additives like MoS_2 may be used in the industry for wider range of operating condition due to better tribological and mechanical properties and he investigated that copper with zinc and tin based bearing materials were better than those of aluminium and combination of SnPbCuSb bearing materials, particularly at low loads. Self-lubricating bushing is one of the most attractive applications of porous powder metallurgy (P/M) parts. The most widely used materials for porous self lubricating bushes are bronze and iron–bronze, iron-based powders and nickel-based alloys [6, 7]. Elements like graphite, MoS_2 which have self- lubricating nature, are added to sintered materials to improve the wear characteristics [8,9]. However, Fe based sintered alloy with parametric variation have not been studied extensively under different tribological conditions. But in order to meet the requirement of various applications, it is important to choose material with appropriate properties at specified condition of running. This may be achieved by choosing efficient alloying with desirable combinations of elements by varying curing temperature, hardness, compaction pressure and porosity etc. At present, no suitable data are available for commercial use from tribological point of view and it is important to have necessary performance data on such bearings.The aim of the present study is to investigate the tribological behaviour of Fe based sintered material using a dedicated test rig. The effect of manufacturing and process parameters on the tribo-responses, namely coefficient of friction and wear are reported. A comparison of specific wear rate among materials with additive has been shown. The morphological changes of the worn surfaces of samples are also examined through SEM.

II. Experimental procedure

2.1. Tribology test

The experiments were carried on a specially designed "Dry bearing test rig", having shaft as counter surface - size 50 mm made up of hardened steel (Rc-65) and surface roughness of 0.45μm (CLA). Test bearing is mounted on the shaft experiencing direct loading under a wide range of speed. Friction force was measured by a load sensor attached to the swinging arm connected to the motor and located in the frame (fig 1b). After running the samples for required duration of time on dry bearing test rig, wear was observed as dimensional changes of specimen and measured on 3D-coordinate measuring machine. Dimensional changes of specimen bore are measured before and after experiment and average wear are calculated by noting the difference in average diametral dimension of bearing bore size. The unit has got a control panel properly interfaced with the PC for data logging of process parameters. The test rig is shown in Figure 1(a) and 1(b). Tribological interface of mating surfaces has been depicted in figure 1(c). Operating test conditions are given below.

Table 1. Operating test conditions

Speed m/s	Specific pressure, N/mm^2	Time of running,
0.5-2	2-8	5-20 min for friction and 8 -16 hrs for wear

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Wear Model of Dry Sintered Bearing Material by Dimensional Analysis

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Abstract : The aim of this research was to investigate and analyze the wear of sintered dry bearing material. A mathematical model considering lump parameters was developed using dimensional analysis technique and expressed in terms of the operating parameters and constructional parameter of the material. Tribo-experiments were conducted on a dedicated test set-up which simulates the actual contact conditions as practiced in industry. This paper highlighted the wear characteristics of a sintered dry bearing material under sliding contact conditions to anticipate possible wear regime.

Keywords: Wear model, Dimensional analysis, sintered material, Dimensional analysis, wear

I. INTRODUCTION

The wear of material depend on different parameters in tribo-system and these parameters could be linked with a group of parameters such as process parameters, constructional parameters, interacting bodies and the working environment etc. [1].In a tribo-system wear is not an intrinsic material property; rather it depends on operating variables and/or physical quantities and the contact conditions. Bellow et al. [2], Kar et al [3] Rhee et al [4] and Viswanath et al [7] have developed various forms of equations/relationships for the wear of plastic materials. Few authors used different type of mathematical model to prove wear and friction equations or relationships [8, 9, 10, 11, and 12]. All these models have expressed wear volume as a function of either operating variables such as speed, pressure and duration or some properties of material. Various models representing wear volume as a function of either operating variables or material properties were developed but they are limited to plastic/polymer materials and lubrication condition/lubricants additives only[13, 14, 15, 16]. And the friction and wear characteristics of different material were evaluated with the help of Pin-on-disc and four ball testers under sliding conditions.
The aim of the present work is to investigate and analyze the wear of sintered bearing under dry condition with the help of simulated test condition. Various parameters like process parameters, constructional parameters and environmental parameters etc affect wear with increasing or decreasing effect. It becomes difficult to study all parameters at a time; therefore, authors felt that on forming lumped dimensionless parameters may be useful in estimating wear. Hence a mathematical model is developed with the help of a dimensional analysis. In order to study wear characteristics, a dedicated set-up is developed and dimensional wear values were measured on three dimensional co-ordinate measuring machine (CMM) having a least count of 0.1μm and thereby calculating volume of wear over contacting area of bearing.

II. DIMENSIONAL ANALYSIS MODEL

Dimensional analysis (DA) is a mathematical technique which makes use of the study of dimensions as an aid to the solution of problems. It is based on the hypothesis that the solution of the problem is expressible by means of a dimensionally homogeneous equation in terms of specified variables. The principal use of DA is to characterize a phenomenon in terms of the relationships among dimensionless variables which are fewer in number than the original physical variables and in turn reducing the complexity of experimental variables which affect a given phenomenon. There are many methods of DA, the authors tried to investigate the wear of bearing specimen made up of sintering material under dry condition. Using a dimensional analysis of Buckingham Π theorem method. As mentioned earlier, the operating parameters are Pressure (P), sliding speed (v), Time or test duration (T) and/or sliding distance. Constructional parameters are Hardness (H), Density (ρ), Specific heat capacity (Cp), Thermal conductivity of material (k) and Modulus of Elasticity (E). Wear rate (W) was measured as the main dependent variable.
The variables involved in this process are as W, P, v, T, Pc, Cp, k, H and E. The functional equation for wear (W) may be expressed as,

$$W = f\,(P, v, T, Pc, Cp, E, k, H) \qquad (2.1)$$

General form may be written as,

$$\psi\,(W, P, v, T, Pc, Cp, E, k, H) = C \qquad (2.2)$$

A set of variables with their dimensions taken for consideration are as follows (ref. Table-1).

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Experimental investigation of forming parameters for square cup deep drawing process

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ABSTRACT

Manufacturing a defect free drawn part is always challenging task. This paper presents numerical analysis and experimental validation of deep drawing process in order to avoid thinning and wrinkles. Numerical and experimental approaches are used to analyze the effect of different drawing parameters such as blank shape, blank thickness, load, dry/wet lubrication on square cup drawing process using extra deep drawn steel (EDD) sheet material. Results of simulation through computer aided engineering (CAE) software are validated through experimentation. Formability analysis on the laser engraved circular grids formed on the blank surface is carried out using forming limit diagram (FLD). The optimized process parameters helped to form a square cup without any defects such as thinning, wrinkling, etc. Experimental and formability analysis showed that for considered process parameters, formability of material having a blank thickness of 2 mm is better as compared to a blank thickness of 1 mm and 0.8 mm, for load of 100 kN with dry lubrication. This work highlights the significance of forming limit diagram technique in strengthening numerical and experimental investigation of deep drawing process. In overall, this parametric study leads to prediction of final geometry of sheet blank accurately and distribution of strain and stresses, for the development of quality product through forming process.

Selection and peer-review under responsibility of the scientific committee of the International Conference on Advances in Materials Processing & Manufacturing Applications.

1. Introduction

In the automotive industry the sheet forming process is a widely used manufacturing process. It is a process of deformation in which the sheet material plastically deforms to convert the sheet metal into a desired shape without any defect like necking or crack [1]. Deep drawing operations where sheet metal is transformed into desired shape by the action of a punch force into a die cavity to manufacture light weight, higher strength, low density, and corrosion resistible products for automotive bodies, structural parts, utensils and beverage cans, etc. [2]. The occurrence of any manufacturing defect in deep drawing is highly undesirable as the tools and the dies used in this process are expensive. Any kind of redesigning in the process leads to dramatic increase in the final cost of the product [3].

In deep drawing, various process parameters are required to be controlled to avoid defects in the drawn part such as wrinkling, fracture, thinning. Wrinkling is the most common mode of failure affecting adversely the aesthetic and functionality of the product. Excessive metal flow causes wrinkles in the product whereas insufficient metal flow results in tears or splits. Thus, wrinkling, tearing, fracture, or excessive springback are the common failures in the deep drawn products [5]. Areas of high compressive strains are prone to wrinkling whereas areas with high tensile strains are prone to the problem of necking. Wrinkling in the flange area is possible due to minor compressive stresses in the drawn sheet. At the same time, unsupported regions or the regions in contact with only one tool are also prone to wrinkling [6]. Thus, for prediction and prevention of failures in the final deep drawn product, designing of tooling plays a vital role. Hence more focus is required in optimization of the critical process parameters such as blank holder force, punch force, die radius, punch radius and the coefficient of friction [4,7].

Limited research literature is available in the area of finding the relative effect of various process parameters on the design of deep drawn products using the finite element analysis [8]. The optimization of all the major parameters in order to eliminate wrinkling and validation of obtained results using finite element analysis is one of the feasible and effective ways to produce improved quality prod-

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Stress Analysis of Carbon Fiber Reinforced Composite Laminate with Different Centrally Located Cutouts

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Abstract

Composite panels have been preferred by most of the industries as compared to the conventional metal structure. Unidirectional carbon fiber has become a most favorable area for most of the researchers due to their excellent weight to strength ratio. This study investigates problems associated with stress concentration in composite laminate with different centrally located cutouts of constant area. The analysis was carried out and the stress-strain behavior was presented for different cutouts and orientation [0/90/0/0/90/0]. Numerical investigation shows, stress-strain values were minimum for circular cutout and maximum for rectangular cutout for gradually increasing load from 490 N to 4414 N.

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Keywords: ANSYS; Carbon FRC laminates; Cutouts; Stress analysis; Stress concentration.

1. Introduction

A micromechanics is the study of the composite material behaviour wherein the interaction of the constituent materials is examined in detail as part of the definition of the behaviour of the heterogeneous composite material. Thus the properties of a lamina can be experimentally determined in the 'as made' state or can be mathematically estimated on the basis of the properties of the constituent material [1].

The Reinforcement is usually a strong, stiff material, in the form of long fibers. The matrix is a material that was applied in a liquid form and then cured and hardened. The matrix is applied for the reinforcement support and to distribute the load through the reinforcement and plies. It is common to have plies with fibers in one direction or several directions in a weave. The orientation of the fibers and stacking sequence has measure effect on the deformation and stress throughout the laminate [2].

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RESEARCH ARTICLE

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Predicting Tensile Behaviour of Bulk Bamboo using Weibull Statistics for Progressive Failure

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Bamboo is a natural composite material consisting of unidirectional fibre bundles, oriented along axial direction, embedded in soft parenchymatous matrix. The bundles are arranged such that the fibre density (or fibre volume fraction) varies from outer to inner periphery of bamboo shoot. The gradation in volume fraction of unidirectional fibre bundles qualifies bamboo as a typical radially graded transversely isotropic material. Being largely a cellulosic material, the fibre bundles have high tensile strength. However, there is great dispersion of these properties. In this work, an attempt is made to model the progressive failure of fibre bundles to predict the failure strength of bulk bamboo in uniaxial tension. A two-parameter Weibull distribution is proposed to analyse the strengths of fibre bundles having different cross-section areas. Tension tests are performed on fibre bundles, selected from different fibre density regions in the transverse cross-section of bamboo, for determining statistical parameters. The results highlight the close resemblance between the Weibull probability distribution of the experimental results on fibre bundles and overall mechanical behaviour of the bulk bamboo. Thus, the use of Weibull parameters is established for predicting the strength of bulk bamboo from fibre bundle testing of different cross-section areas.

Introduction

Bamboo is a monocotyledonous plant and a true grass *Poaceae* which is widely used in various traditional and industrial applications (http://nbm.nic.in/Achievement/Handbook%20on%20Bamboo.pdf) as well as utilized to design robust structures [1]. It resembles a typical fibre reinforced composite where the fibre bundles are reinforced in parenchymatous matrix tissue (see, **Fig. 1**). Moreover, in bulk bamboo, the density or volume fraction of the fibre bundles continuously varies from 22% at inner periphery to 62% at the outer. It has been shown that the variation of the longitudinal stiffness closely correlates with the variation in the fibre bundle density [2]. The microfibrils are arranged in spiral fashion in the matrix. The average orientation of the microfibrils about the longitudinal axis which is known as mean microfibril angle (MFA) is one of the key parameters governing the longitudinal stiffness of bulk bamboo. The particular arrangement of fibre bundles on cross-section (see, **Fig. 1(b)**) makes bulk bamboo a transversely isotropic material.

It has been found that the longitudinal Young's modulus and strength of bamboo are linearly increased from the inner to outer side [3]. Bamboo, in particular, the species *Dendrocalamus strictus*, has an average Young's modulus of 10 GPa [2]. This qualifies bamboo a superior structural material. The Young's modulus for other common species is of the same order. For example, the mechanical stiffness and strength of bulk bamboo, for species *Phyllostachys edulis* and *Phyllostachys pubescens*, have been exhaustively worked upon in the former [4] and in the latter [5]. Mechanical properties of bamboo internodes are transversely isotropic due to axial alignment of fibre bundles. However, in nodes, the fibre bundles are randomly distributed, thereby producing isotropic properties.

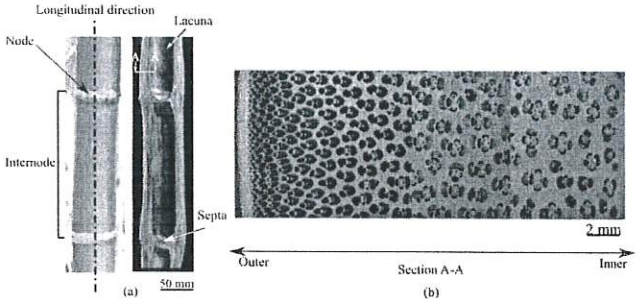

Fig. 1. (a) Longitudinal section of bamboo. (b) Section A-A showing graded distribution of fibre bundles, denser at the outer radial location of bamboo.

Fibre bundle is the basic stiffening element of bamboo [6]; which indicates that most of the mechanical properties of bamboo are directly derived from the fibres' properties and fibre strength distribution, as well [7]. It has been observed that typical bamboo fibres are brittle [8] and to study the brittle fracture of fibres, conventional theory has been used. Recently, a statistical weakest link theory is introduced which assumes that a material is made of small elements which are linked together and it can be

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FINITE ELEMENT ANALYSIS COMPARISON OF SPUR GEARS BETWEEN STANDARD TOOTH PROFILE AND MODIFIED PROFILE

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Abstract - *In gearbox systems, most important objectives is to achieve gears with high efficiency so that to reduce power losses, noise, operating temperatures and wear. This is achievable by making different types of modifications in gearing system. Tooth profile modification plays good role in this. Aim of the work is comparison in spur gear pair strength by modification of top of tooth profile i.e. addendum. Two lifferent gear profiles are used for comparison. One is standard involute profile and other is modified involute. Both cases all other parameters are kept constant. Both profiles are modeled in 3d software and analyzed using FEA. Gear teeth profile modifications are mainly investigated in detail and compared in terms of strength.*

1. INTRODUCTION

One of the most efficient and important mechanism is power transmission with gear system in current mechanical industries. These mechanisms are very important in many systems like automobile, aerospace, ships, vehicles having applications of high efficiency, lighter weight, reliability of gears etc. Efficiency of gears is important topic in gear industries. Due to friction results heat generation in between gears, many gear failures like scoring, contact fatigue failures are related to the efficiency of the gear pair.

2. DESIGN & MODELLING

In design two separate gear pairs are designed. These gears are designed for specific torque. Design considerations are as shown in Table 1.

Table -1: Specifications & Parameters

Parameters	Value
No. of teeth	17
Module	1.246
Gear ratio	1
Pressure angle	20^0
Face width	12.5 mm
Pitch diameter	21.182 mm
Torque	14500 Nmm
Addendum	0.997 mm
Dedendum	1.246 mm
Addendum Circle Diameter	23.18 mm

Below Fig 1 shows 3d model of gears modelled using involute curve.

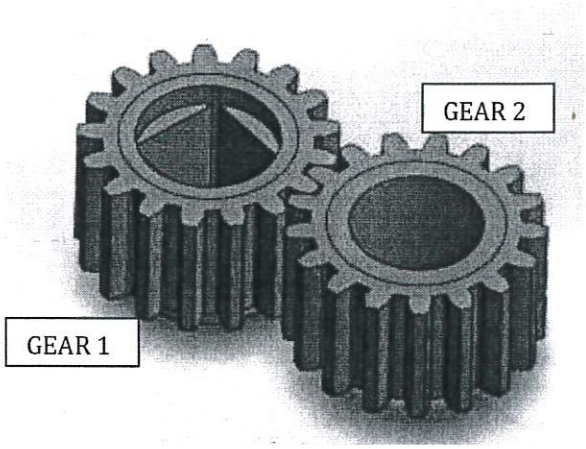

Fig -1 3D View of modelled gears

Two parameters are represent profile modification, the normalized amount (height/ depth) of modification (h_n) at the gear teeth and normalized length (extent) of modification (L_n).
The parameters can be defined as

$$h_n = \left[\frac{h_x}{h_w}\right]$$

$$L_n = \left[\frac{L_x}{L_w}\right]$$

Where
h_x = Amount of profile modification
L_x = Length of profile modification
L_w = Distance from the tip to the highest point of single tooth contact (HPSTC) of gear tooth
h_w=Standard amount of profile modification
The minimum tip relief should be equal to twice the maximum spacing error plus the combined tooth deflection evaluated at HPSTC.
here module m= 1.246
h_w= 0.02 X 1.246 = 0.025 mm
L_w = 0.6 X 1.246 = 0.747 mm

Modification ratio L_n and h_n for different speeds is defined,
From that,
L_n = 0.9 mm
h_n = 0.9 mm
We get followings,
L_x = 0.672 mm
h_x = 0.0225 mm

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A REVIEW OF COMPUTER APPLICATION FOR SELECTION OF HARMONIC GEAR DRIVE

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Abstract —

As harmonic-drive transmissions find increased use and acceptance among engineers and designers for robots, manipulators, machine tools, etc. The demand for an accurate and reliable understanding of harmonic-drive operating behavior becomes useful. This review paper is dedicated to the study of the harmonic gear drive, which provides high-speed reduction & power transmission capability. This drive provides preciseness with a lot of less area as compared to different power transmission drives further as there's a negligible internal backlash. This paper will discuss the construction, working principle, review on design of harmonic drive, and characteristics of the drive with its advantages. For the selection of proper Drive according to required applications, it is necessary to the study, to develop a computer program that allows the correct choice of the harmonic drive-by developed algorithm. This paper deals with a method of selection of the proper gear drive according to requirements.The three-dimensional models of the gear driveexplain details about selection. This complexity necessitates a more real-life approach based on computer application.

Keywords— *Harmonic Gear Drive, Strain Wave, flexispline, wave generator, Computer Application.*

I. Introduction

Most of the conventional gear in the world is circular. This circularity is an inherent choice for avoiding teeth interference in gear. Maintaining a minimum teeth difference between the meshing teeth (pinion and wheel teeth) is also necessary for avoidance of interference. But the harmonic drive is noncircular gear (circular spline is circular, but Flexspline is oval) and teeth difference between the meshing teeth of flexspline and circular spline is only two.

The harmonic drive is widely used in robotic arm, precision full work, in medical equipment as well as used in speed reduction devices for compact spacing for space application and military missions. The cost for the harmonic gear drive is much higher than that of a planetary gearbox. As the manufacturing and design insufficiency, this product is not easily available in India. For the same, the detailed study of harmonic gear drive will lead to compare different materials and different manufacturing process which can reduce the cost, as well as the product, can be indigenous

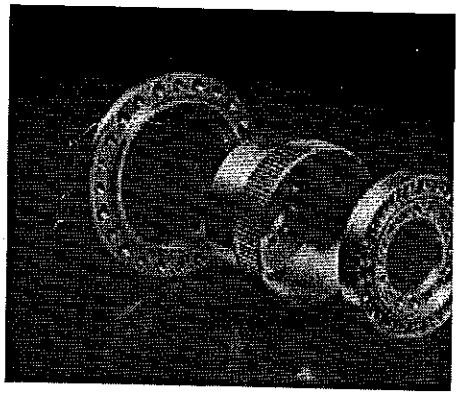

Fig 1: Exploded view of Harmonic Gear Drive

Harmonic Drives also known as strain wave gearing because of tooth engagement is producing sinusoidal wave patterns.The harmonic drive may be a special style of mechanical gear system which will improve sure characteristics compared to ancient shell systems like spiral gears or planetary gears.

A motorhave harmonic drives which includes elliptically deformable geared cup,the wave generator and the circular spline which changes its contact points with the circular spline when elliptical wave generator rotates. each 3600 rotation of the wave generator moves the flex spline by solely by the distinction within the variety of teeth within the flex spline and therefore the circular spline. Harmonic drives are used during a sort of applications like peddling machines and rotating home-television antennas, low-priced client applications as Camera lenses to classy systems for military and part utilization.Harmonic drives have been utilized in a variety of applications like vending machines and rotating home-television antennas, low-cost consumer applications as Camera lenses to sophisticated systems for military and aerospace utilization.

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Smart Surveillance Drone – Warehouse Operations

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Abstract: *Drones have recently gained in popularity and are now frequently used for a variety of purposes. The majority of commercially available drones are generally non-self-governing and require the assistance of a human operator. However, advances in computer vision and artificial intelligence in general have drastically altered the situation. The growing scale of warehouses, as well as the difficulty in hiring trained workers, rising demand for customer services, and the rise of e-commerce, have heightened the need for warehouse operations to be more efficient through automation. In warehouses, drones may be a feasible alternative to manual inspections and surveillance activities. They can also be used for intralogistics, such as transferring parts from warehouses to assembly lines in factories. Multiple organizations throughout the world have been doing product delivery studies, but the focus of this article will be on the use of drones in warehouses for inventory management, which is gaining traction every day. Inventory management, stock inspection, and visual feedback will be the project's main applications. Manually inspecting the condition of things or confirming the contents of a product is common. The system makes it possible to do so fast and efficiently. The method allows still photographs to be collected for subsequent processing or a live video feed for FPV viewing because the drones are equipped with cameras. The report contains a thorough examination of the done systems and their application in warehouse management.*

Keywords: Drones, Logistics, Warehouse, Stock Inspection, Inventory Management, Visual Feedback, Cameras Drones, Logistics, Warehouse, Stock Inspection, Inventory Management, Visual Feedback, Cameras

I. INTRODUCTION

Drones have particularly found applications in warehousing operations. Recent technological advances in drones such as visual-based navigation and sensors enable indoor applications of drones. In addition to the advancement of drone technology, the main reason is that the scale of warehouses is increasing due to the growth of global e-commerce. For instance, drones can be used for automated inventory checks and intralogistics. Using drones for such applications can help warehouse managers to remove tedious and dangerous tasks. The use of drones in warehouses has been increasing over the past years. Large warehouses are aiming to increase efficiency by investing more in automation and robotics. This is not without precedence since the cost of warehousing operations account for 30% of the total costs in logistics. Furthermore, the difficulty of attracting skilled laborers, increasing demand for customer services, and the rise of e-commerce have intensified the need to further increase efficiency in warehouse operations.

1.1 Objectives

- To design a quadcopter-based system, which would be able to successfully percept a designated object in its surrounding and be able to track it after developing unique identifications for each of initial detections.
- To build an in-built barcode scanning system for product management and inventory inspection.
- To build a drone which will help in warehouse management with respect to location of the product and provide live feedback to the manager.

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REGULAR PAPER

Tolerance Analysis in Selective Assembly of Multiple Component Features to Control Assembly Variation Using Matrix Model and Genetic Algorithm

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Abstract

A product may consist of two or more components being assembled together. The geometrical and dimensional tolerances (GDT) present in each feature of the components influence the performance of the assembly. Their accumulation and propagation on assembly fit can be investigated by tolerance analysis. However, during the high precision assembly manufacturing, especially in the selective assembly process, only the dimensional deviations of mating components are considered to evaluate the assembly fit. In this paper, the assembly fits in selective assembly due to GDT of an individual feature of components, is modelled by the matrix method of tolerance analysis. Based on the principles of Technologically and Topologically Related Surfaces and Minimum Geometric Datum Elements, a worst case tolerance analysis is applied into the selective assembly. The conventional method of dividing the components into groups (bins) by dimensional deviation is replaced by integrated GDT. The best combination of components to obtain minimum assembly variation is achieved through a genetic algorithm. The proposed method is demonstrated using a two-dimensional valvetrain assembly that consists of camshaft, tappet, and valve-stem. The effect of considering and annulling the GDT in selective assembly is verified up to 20 numbers of group size.

Keywords Selective assembly · Tolerance analysis · Matrix model · Valvetrain assembly · Genetic algorithm

1 Introduction

An assembly is an integrative process of joining components to make a complete product. The functional performance of an assembled product and its manufacturing cost are directly affected by the individual component tolerances. Perhaps the manufacturing team needed to understand why an assembly of parts that met the drawing specifications did not fit together at assembly. By performing tolerance analysis and tolerance stackups, these and many other important questions about the design can be answered [1]. Tolerance stacks are a simple and straightforward approach to model the effects of dimensional deviations on distances between different features in an assembly. It includes most often only dimensional tolerances (DT), though modern modifications of this method also consider geometrical tolerances [2]. In practical manufacturing conditions, the propagation of geometrical and dimensional tolerances (GDT), as well as the clearances between mating components, will cause the deviations of some mating features from their nominal positions, resulting in the influence on the assembly precision [3]. Even though modern manufacturing processes achieve increasingly high accuracy, geometrical deviations have a huge influence on both the functional behavior and on the customers' quality perception of the product [4, 5]. It makes a strong necessity for companies to manage these geometrical variations [2]. While geometrical variation is summarized with DT, it is possible to control a wider range of variations related to shape, position, and orientation of geometric features within the allowable constraints [6]. In order to ensure component interchangeability, geometrical tolerances are specified to limit the allowable geometric part deviations from an assembly as well as functional point of view [7, 8]. This system of interchangeable assembly is desirable for speeding up the assembly process and reducing cost as components are chosen randomly to cause minimum

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Use of Analytical Hierarchy Process for the Selection of Optimum Parameter of IC Engine

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Abstract - *The Analytical Hierarchy Process (AHP) was introduced by Thomas L. Saaty in 1977 and 1994. The AHP is the decision making approach mainly based on mathematics and psychology. The AHP can be used to solve complex problems which involve multi – criteria. Input data required for AHP is easy to obtain, due to this reason most of the researchers get attracted towards AHP for the solution of their problems. It uses a multi – level hierarchical structure of objectives, criteria, sub criteria and alternatives.*

Keywords: Analytical Hierarchy Process, AHP, IC engine, engine performance

1. INTRODUCTION

AHP can be used in various fields like healthcare, business, government, education. AHP do not suggest a particular decision, but provides the one solution that best suits their goal. AHP can also be used for particular application in group decision making. AHP is a multiple criteria decision making (MCDM) or multiple criteria decision analysis (MCDA) tool. These tools are concentrated on structuring and solving the complex problems having multiple criteria (or multiple solutions). Typically, there does not exist a unique optimal solution for such problems and multiple criteria decision making (MCDM) or multiple – criteria decision analysis (MCDA) helps in choosing the "best" alternative from a set of available alternatives i.e. the most preferable one.

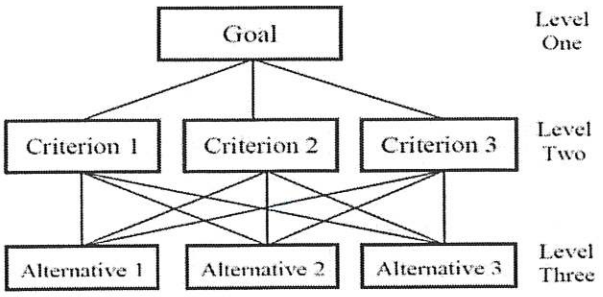

Figure 1.1 Sample hierarchical tree

1.1 Literature review

[1] Vincent H. Wilson et al conducted study on to optimize the control parameters of the direct injection (DI) single cylinder diesel engine with respect to NOx (Oxides of Nitrogen) and fuel emissions through experimental investigations and Taguchi method. A single cylinder 5.2 kW diesel engine was selected for this experiment. Five parameters such as clearance volume, valve opening pressure, nozzle-hole diameter, static injection timing and load torque were varied at four levels and the responses such as NOx emissions and fuel economy were recorded. The optimum values of the response variables could be predicted using S/N ratio and optimum combination of control parameters were specified.

[2]Chedthawut Poompipatpong, Athakorn Kengpol et al conducted study on various engine sizes and operating conditions. The objective of this research is to weight the frequently used engine parameters, which helps researchers to make a better decision under multi-criteria situation. The engine parameters are classified into three groups and weight by the integrated AHP-Delphi method, which converts opinions into numerical values. Moreover, it can deal with a group decision making to obtain the consensus of specialists.

[3] S.Arunprasad1, T.Balusamy et al conducted study on to optimize the engine parameters by using biodiesel as a fuel. Neem oil is used as a bio diesel in CI engine which is produced by Tran's esterification process. Taguchi optimization technique was used to get optimum level of parameters such as brake thermal efficiency (BTHE), indicated thermal efficiency (ITHE) and specific fuel consumption (SFC). Experiments were conducted with neem oil biodiesel blends and diesel value was compared with these results.

[4]G. Sakthivel a, M. Ilangkumaran, Aditya Gaikwad et al conducted study on application of hybrid Multi Criteria Decision Making (MCDM) technique for the selection of optimum fuel blend in fish oil biodiesel for the IC engine. Evaluation of suitable blend is based on the exploratory analysis of the performance, emission and combustion

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Multi- Attributes Decision Making to Evaluate the Performance of Indian Small Scale Machining Industry by using Field Data Based TOPSIS Method.

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Abstract : Field data based TOPSIS method helps the industrial practitioners for the performance evaluation of the Indian small scale machining industry. In the machining environment, large numbers of parameters are affecting the various attributes or the responses. The various attributes concern with the machining processes are human energy (HE), productivity (PROD),dimensional accuracy (DAC), surface roughness (SURF),material removal rate (MRR) and the power consumption (PC).In this study the effect of various independent parameters affecting the turning of nonferrous materials on various attributes is examined using FDB-TOPSIS method. The input parameters are machine operator data, cutting tool data, work- piece data, cutting process data, lathe machine and the machining environmental data. The experimental data are gathered using random plan of experimentation, industry constrains and the seasonal conditions in India. Evaluation and selection of a best machining parameters is a complex decision-making problem involving multiple contradictory criteria. This paper presents a commonsensical procedure to evaluate the dry turning of nonferrous material such Al6063 and brass by using FDBM -TOPSIS method. This paper shows a successful application of FDB-TOPSIS to the evaluation of the performance of convectional dry turning process in an Indian context.

IndexTerms - **Convectional Dry Turning,TOPSIS Method,Multiple-criteria decision making, Indian Small Scale Industry, Field data base Method**

I. INTRODUCTION

Convectional dry turning (CDT) is a process in which the material from the work piece is removed by the series of metal cutting operation. Generally most favorable cutting conditions are selected based on the operator experience and different material handbooks available. However it does not assured that the selected parameters are optimal. Selection of non optimal parameters leads to the economic loss to the industry. Several researchers have contributed significantly in the direction of model formulation based on experimental data. G.R. Jahanshahloo et al. [1] has studied the extend TOPSIS method to decision-making problems with fuzzy data. The rating of each alternative and the weight of each response or criterion are expressed in triangular fuzzy numbers. They have used a-cuts to normalized fuzzy numbers. In some cases of the real life situation, determining the exact value of the response variables or attributes is very difficult and hence, their values are considered as fuzzy data, therefore, the researcher has used TOPSIS for fuzzy data and an algorithm to determine the most preferable solution among all possible alternatives. When data is fuzzy, a-cut concept is used to find out the normalized fuzzy decision matrix. In this approach the distance of an alternative from the fuzzy positive ideal solution and its distance from the fuzzy negative ideal solution are also considered to find out the better ranking. The method presented by the authors can be applied to many areas of management decision problems. Chia Chi Sun [2] has developed fuzzy AHP and fuzzy TOPSIS method as a multiple criteria decision making problems (MCDM). The used methods enables decision analysts to enhanced the complete evaluation process and provide a more precise, efficient, and regular decision support tool. The aim of their research was to construct a fuzzy AHP and fuzzy TOPSIS model to appraise dissimilar notebook computer ODM companies. In the performance evaluation for the notebook computer ODM companies including manufacturing capability, financial capability, innovation capability, supply chain capability, human resource capability, and service quality capability. These factors have generated a final evaluation ranking for priority among these notebook computer ODM companies. The importance of the dimensions is evaluated by experts, and the uncertainty of human decision-making is taken into account through the fuzzy concept in fuzzy environment. From the above research, fuzzy AHP and fuzzy TOPSIS, authors find out the first two important dimensions for notebook computer ODM companies. Gadakh V.S [3] has applied an ideal solution (TOPSIS) method for solving multiple criteria (objective) optimization problem in wire electrical discharge machining (WEDM) process. The results shows that TOPSIS method exactly match with those derivative by the past researchers which confirm the applicability of this method while solving various multifaceted decision-making problems in present day manufacturing environment. Gusti Ayu Made Shinta et al. [4] has used fuzzy Multi Attribute Decision Making (FMADM) with the method TOPSIS. In their study, several criteria were used such as GPA (Grade Point Average), quotients of income parents by the number of dependents, number of dependents parents, the usage of electrical power and student activities. E.O. Ezugwua et al. [5] was developed an artificial neural network (ANN) model the analysis and prediction of the relationship between cutting and process parameters during high-speed turning of nickel-based, Inconel 718, alloy. The input parameters of the ANN model were the cutting parameters: speed, feed rate, depth of cut, cutting time, and coolant pressure. The output parameters of the model were seven process parameters measured during the machining trials, namely tangential force (cutting force, Fz), axial force (feed force, Fx), spindle motor power consumption, machined surface roughness, average flank wear (VB), maximum flank wear (VBmax) and nose wear (VC). The model consists of a three layered feed forward back propagation neural network. The model can be used for

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Investigation of Performance of CI Engine with Rotating Energy Exchanger (REE)for Variation of Intake Air Temperature

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Abstract: *Rotating Energy Exchanger are used very commonly in air conditioning system to control humidity and temperature of air supplied to air conditioning system. Hence this equipment can be effectively utilized for heat exchange purpose to recover waste heat from CI Engine exhaust. It has been observed that the exhaust temperature of C.I. engine is more than 340-degree Celsius rotating energy exchanger can be used to reheat the air intake to the C.I. engine to improve its performance by using the waste heat recovery system i.e., Rotating Energy Exchanger.*

This paper discusses the effect of variation of intake temperature by using various metal base energy exchanging materials to recover the heat energy from exhaust of CI Engine and its impact on performance of CI Engine.

Key Words – Rotating Energy Exchanger, Intake Air temperature, CI Engine Performance, Effectiveness of REE.

Nomenclature used-

Q is the heat content in k Cal
V is the flow rate of the substance in m3/hr
Cp is the specific heat of the substance in k Cal/kg °C
ρ Is density of the flue gas in kg/m3
ΔT is the temperature difference in °C
E Is effectiveness
Thi is exhaust inlet temp in °C
The is exhaust outlet temp in °C
Tci is air inlet temp °C
K is thermal conductivity
H1 is enthalpy at inlet
H2 is enthalpy at outlet

I. INTRODUCTION

Waste heat is "heat", that is generated during a method by way of fuel combustion or chemical change, and then "dumped" into the setting even though it might still be reused for some useful and economic purpose. The essential quality of heat isn't the amount owever rather its "value". The strategy of how to recover this heat depends partly on the temperature of the waste heat gases and therefore, the economics concerned. great quantity of hot flue gases is generated from Boilers, Kilns, Ovens and Furnaces. The energy recovery system is largely a tool that utilizes the waste energy or it utilizes the temperature of the gases. The energy recovery system has big selection of the applying within the future .it is a transient take a look at methodology to live the humilities and temperature. Rotary energy exchanger is the transient system that allows to use the waste energy from the engines that enters the atmosphere at the high temperatures. The energy recovery system is that the device which may directly connected to the outlet of the exhaust gas. energy recovery systems are the systems which may be employed in the devices like boilers, super heater, gas duct systems (from turbines/engines).

The energy recovery system is that the device that consumes negligible energy therefore it helps to recover energy at the negligible worth. Thus, it will facilitate within the conservation of the energy. these devices are one-time investment. these systems are capable of recovering 75% of the energy. The rotary energy exchanger has wide selection of the applying, like it is employed in a space ventilation, It also can be used for maintaining the humidifies of the space, The energy recovery system is conjointly employed in the thermal power stations wherever the heat of the heat is exhausted, which may be used for drying of the product. If a number of this waste heat can be recovered, a substantial quantity of primary fuel can be saved. The energy lost in waste gases cannot be absolutely recovered. However, a lot of heat can be recovered and loss reduced by adopting following measures as outlined during this chapter.

BENEFITS OF WASTE HEAT RECOVERY-

Advantages of 'waste heat recovery' may be broadly speaking classified in 2 categories:

Direct Benefits:

Recovery of waste heat features a direct impact on the efficiency of the method. this is often mirrored by reduction within the utility consumption & prices, and process value.

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Analyze the Impact of Machining Environment on Human Energy in Indian Small Scale Industries

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Abstract-In any cutting process, apart from obtaining the good surface quality, accurate dimensions, maximized productivity, metal removal rate and minimization of power consumed; human energy required during the machining process is also of most importance. In Indian scenario where majority of total machining operation are still executed manually which needs to be focused. A traditional machining process involves many process parameters which is directly or indirectly affects the human energy. This article explain an approach to formulate a Field Data Based Model (FDBM) to analyze the impact of various machining parameters on the human energy required during the machining of ferrous and non-ferrous material and develop a mathematical relation which simulate the real input and output data directly from the machining field where the work is actually being executed. . The findings indicate that the topic understudy is of great importance as no such approach of field data based mathematical simulation is adopted for the formulation of mathematical model for human energy required for the machining of ferrous and non- ferrous material.

Index Terms-Field data based model; optimization; Sensitivity; Reliability; Response surface model.

1. INTRODUCTION

This paper explains the mathematical simulation of man-machine system used in the traditional machining process used in Indian scenario. The purpose of developing such field data based model (FDBM) was to overcome the deficiencies in current method, for process improvement, process management and to reduce fatigue in the workers and musculoskeletal injuries. Extensive study has been conducted in the past to optimize the process parameters in any machining process to have the best product. Current investigation on turning process is a formulation of a field data based Methodology applied on the most effective machining field parameters i.e. operator parameter, cutting tool parameter, work piece parameter ,cutting process parameter ,machine specifications and machining environment parameters.

Turning is a widely used machining process in manufacturing. Therefore, an optimal selection of cutting parameters to satisfy an economic objective within the constraints of turning operations is a very important task. Traditionally, the selection of cutting conditions for metal cutting is left to the machine operator Surface roughness, power consumption, material removal rate and productivity has received serious attention for many years. A considerable number of studies have investigated the general effects of the speed, feed, and depth of cut on the turning process. Some researchers studied on the machinability of aluminium-silicon alloys [2-6]. Liu et. al compared the influence of several factors (cutting speed, feed rate and depth of cut) on cutting force and surface roughness by orthogonal tests in turning Si-Al alloy. The results showed that the surface roughness could be improved by using diamond tool [2]. Recently, in order to obtain reasonable cutting parameters in turning casting aluminium alloy ZL108.Wei, Wang, et al analyzed main influential factors of cutting force using carbide tool YG8. The results indicated the depth of cut had great influence on stability of whole cutting process in rough machining. Armarego et. al (1969) investigated unconstrained machine-parameter optimization using differential calculus. Brewer et.al (1963) [3] carried out simplified optimum analysis for non-ferrous materials. For cast iron (CI) and steels, they employed the criterion of reducing the machining cost to a minimum. A number of monograms were worked out to facilitate the practical determination of the most economic machining conditions. They pointed out that the more difficult- to-machine materials have a restricted range of parameters over which machining can be carried out and thus any attempt at optimizing their costs are artificial. Brewer (1966) [3] suggested the use of Lagrangian multipliers for optimization of the constrained problem of unit cost, with cutting power as the main constraint. Walvekar et.al [10] (1970) discussed the use of geometric programming to selection of machine they optimized cutting speed and feed rate to yield minimum production cost. Petropoulos [6] (1973) investigated. Gopalakrishnan et.al (1991) described the design and development of an analytical tool for the selection of machine parameters in drilling. Geometric programming was used as the basic methodology to determine values for feed rate and cutting speed that minimize the total cost of machining SAE 1045 steel with cemented carbide tools of ISO P-10 grade. Surface finish and machine power were taken as the constraints while optimizing cutting speed and feed rate for a given depth of cut. Mangesh Phate et al [18-24] (2012-2019) worked on artificial neural network and the dimensional analysis approach to model the machining and advanced machining performance of ferrous, nonferrous and composite materials.

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Critical Analysis of Machining Performance of Ferrous Materials Using Artificial Neural Network.

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Abstract:

This paper is focused on artificial neural network (ANN) based model for Power Consumption (PC) in the turning of ferrous(En1A, En8 and S.S.304) in a Indian small scale industry. PC from the Field data based model was proved with the testing data and artificial neural network (ANN) model was developed for the analysis and prediction of the relationship between inputs and output parameters during the turning of ferrous and nonferrous materials. The input parameters of this model are operator, work piece, cutting process, cutting tool, machine and the environment. The ANN model consists of a three layered feed forward back propagation neural network. The network is trained with pairs of inputs/outputs datasets generated when machining ferrous material. A very good performance of the neural network, in terms of agreement with field data, was achieved. The model can be used for the analysis and prediction of the complex relationship between dependent (Power Consumption) and the independent parameters in turning operations.

Keywords: *Artificial Neural Network Model, Ferrous Material, Generalised Model , En1A, En8, S.S.304, Univarent Analysis.*

1. Introduction

Turning is a widely used machining process in manufacturing. Therefore, an optimal selection of cutting parameters to satisfy an economic objective within the constraints of turning operations is a very important task. Traditionally, the selection of cutting conditions for metal cutting is left to the machine operator Surface roughness, power consumption, material removal rate and productivity has received serious attention for many years. A considerable number of studies have investigated the general effects of the speed, feed, and depth of cut on the turning process. Some researchers studied on the machinability of aluminum-silicon alloys [2-6]. Liu et. al compared the influence of several factors (cutting speed, feed rate and depth of cut) on cutting force and surface roughness by orthogonal tests in turning Si-Al alloy. The results showed that the surface roughness could be improved by using diamond tool [2]. Recently, in order to obtain reasonable cutting parameters in turning casting aluminum alloy ZL108.Wei, Wang, et al analyzed main influential factors of cutting force using carbide tool YG8. The results indicated the depth of cut had great influence on

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PREDICTION AND ANALYSIS OF SURFACE ROUGHNESS IN WEDM OF AL/GR/CP5 MMC USING RSM & ANN

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ABSTRACT

Wire electric discharge machining i.e. WEDM is very popular non-conventional machining process. Most of the machining industries preferred WEDM as an economical and effective machining process. Along with the use of aluminium, its composite are going to be very popular and fulfill the industrial need. To maximize the use of WEDM for getting the economical and precise outcomes, analysis is very important. There are so may process parameters concern with the WEDM process, but it was really a tough job to correlate all the process parameters. Hence the parameters such as P-on time (TON), P-off time (TOFF), wire federate (WFR) and the input current (IP) has been finalized for the investigation. The new aluminium based metal matrix with graphite (5%) as a filler metal was selected for the investigation. Taguchi L_{27} (3^3) design of experimentation plan has been employed to carried out the experimentation. Two modelling techniques i.e. response surface method (RSM) and soft computing technique i.e. artificial neural techniques has been adopted for the analysis. From the experimental findings, it has been observed that both RSM and ANN have efficiently predicted the response with an acceptable agreement measure in terms of correlation coefficient. Feed forward back propagation neural network was employed for the analysis through ANN while the second degree response surface model was formulated for response surface method. Analysis of variance (ANOVA) was carried out to know the impact of various process parameters. But the ANN was superior to the RSM model hence recommended for the investigation of such process.

KEYWORDS: *Al/Gr/Cp5 MMC,ANN, ANOVA,RSM,WEDM.*

1. INTRODUCTION

At the moment, the use of lightweight materials such as aluminium, magnesium and their composites are effectively sprouting in various fields like space equipments, automobiles, and medical, household and other metal concern industries. The demand of these materials are going to be increase drastically sue to the properties such as higher value of thermal and electrical conductivity, high weight to strength ratio, low density , higher value of damping coefficient etc. Hence, it is today's need to focus on the fabrication and processing of such materials. The present work focus on the fabrication and wire cut electric discharge machining (W-EDM) of new aluminium based metal matrix composite (MMC) with 5 % graphite (by weight). The fabricated MMC is designated as Al/Gr/Cp5 MMC. V. Kavimani et al. [1] has develop new MMC using magnesium as a alloying materials. The experimental investigation has been carried out to know the impact of various process parameters. The response parameters were material removal rate and the surface roughness.

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Prediction and Analysis of Apparent Masses (AM) of Anthropometric based Human Seated Posture

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ABSTRACT: The vibrations in the moving parts such as vehicles, machinery are exposed to the various injuries, back pain, muscular disorder etc. The effects of such vibrations are more in the case of driver specially truck driver. In the present work, the investigation is carried out for the human seated posture. Six degrees of freedom (6-DOF) was developed for the human sated posture. Most of the researchers are working in the same direction to minimize the impact of vibration created from the moving vehicles. The apparent mass (AM) was focused for the investigation. Higher value of the response AM causes discomfort and various issues related to the health. The parameters such as the age of the driver, weight, stiffness coefficient of the body segments and the damping coefficients are considered for the investigation. Taguchi's mixed plan of design of experimentation L_{18} (2^1*3^3) was chosen for the experimentation. Two groups of male subjects (more than 50 years and less than 50 years age) were selected for the investigation. Three drivers with weights less than 60 kg, weight between 60-70 kg and the weight greater than 70 kg were selected for the experimentation. The well known desirability function (DF) was employed to find out the optimum parameters which minimize the response AM. The human body is a very complex structure so two dimensional model with six degrees of freedom is selected in the presented work. The present work will help the industries to design the anti-vibrational device. The presented work may also be lengthened to develop similar models with others degrees of freedom.

KEYWORDS: *Six-DOF, Age, Weight, Stiffness, Damping coefficient, RSM, Desirability function.*

1. INTRODUCTION

Prolonged vibration in human seated posture cause very serious injurious in the body such as back pain, visceral dysfunctions, musculoskeletal disorders etc. So many health issues have been reported in the case of moving vehicles drivers, tractor and truck driver and other moving vehicles drivers. N. Shibate [2] analysed the impact of phase difference on the biodynamic responses such as seat to head transmissibility and the apparent masses. The author considered the dual –axis vibration to analyse the effect of phase angle differences between two translational vibrations. From their study, it has been observed that the phase angle difference affected the biodynamic response. S. Mandapuran et al. [3] investigated the biodynamic responses of a human seated posture. The whole body was subjected to the vibration in three directions. None adult male subjects were considered for the investigation. Dewangan et al. [4] investigated the impact of gender and the anthropometric features of a human seated posture on the biodynamic response apparent mass. 31 male and 27 female subjects were considered for the investigation. The response was analysed by grouping the datasets

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A review of the open-access scenario in Afghanistan

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Library Hi Tech

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Abstract

Purpose

Open access movement is getting increased in Asia and the Pacific and has been started in the form of subject gateways, informal collections of articles on web pages and directories. Many Asian countries adopted the transition to Open Access journals and full-text repositories and digital libraries. Open access also helps to underprivilege countries to spread their research output. But third-world Islamic countries are far away from open access and its implementations. The purpose of this paper is to focus on open-access e-resource development in Afghanistan.

Design/methodology/approach

The data were complemented by documentary analysis, and information retrieved from open-access databases like DOAR, DOAJ and OER Sites.

Findings

The paper provides information about open-access development in Afghanistan and also focuses on the challenges for spreading OA awareness in Afghanistan. It suggests that how local people and universities can help to spread open-access movement.

Social implications

This paper gives an idea about the educational system and other resources available in Afghanistan.

Originality/value

This paper fulfills an identified need to study open-access development and status in Afghanistan.

Keywords

Open access Afghanistan Open access development Afghanistan

Citation

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Journal of Advancements in Library Sciences

Open Access E Resources Development in India and China:A Comparative Study

Vrushali Dandawate, M. Dhanamajay, P. S. Kattimani

Abstract

Open access is gaining popularity in Asian countries. Subject gateways, institutional repositories are rapidly increasing in Asia. Major countries in Asia have adopted information technology for providing information services. As well as internet connectivity is also growing, so many librarians are using ICT technology to build their institutional repository services which is helpful for growth of open access. India and China are strong countries in Asia. China is already leading ahead among all Asian countries in terms of research output, while India is also focusing on major research activities. This Both these countries witnessed the transition to open access journals and full text repositories and digital libraries. This paper study will try to find out open access e e-resources development in India and China.

Keywords- *: Open access, open access India, open access China*

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