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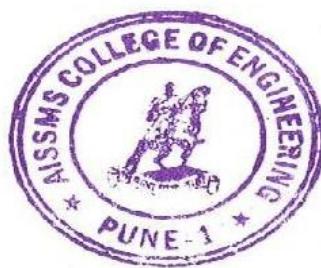
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Prediction of coal ash fusion temperatures using computational intelligence based models

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 Ashis Mukherjee⁴ · Tarit Baran Das⁵

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Abstract In the coal-based combustion and gasification processes, the mineral matter contained in the coal (predominantly oxides), is left as an incombustible residue, termed *ash*. Commonly, ash deposits are formed on the heat absorbing surfaces of the exposed equipment of the combustion/gasification processes. These deposits lead to the occurrence of slagging or fouling and, consequently, reduced process efficiency. The *ash fusion temperatures* (AFTs) signify the temperature range over which the ash deposits are formed on the heat absorbing surfaces of the process equipment. Thus, for designing and operating the coal-based processes, it is important to have mathematical models predicting accurately the four types of AFTs namely *initial deformation temperature*, *softening temperature*, *hemispherical temperature*, and *flow temperature*. Several linear/nonlinear models with varying prediction accuracies and complexities are available for the AFT prediction. Their principal drawback is their applicability to the coals originating from a limited number of geographical regions. Accordingly, this study presents computational intelligence (CI) based nonlinear models to predict the four AFTs using the oxide composition of the coal ash as the model input. The CI methods used in the modeling are *genetic programming* (GP), *artificial neural networks*, and *support vector regression*. The notable features of this study are that the models with a better AFT prediction and generalization performance, a wider application potential, and reduced complexity, have been developed. Among the CI-based models, GP and MLP based models have yielded overall improved performance in predicting all four AFTs.

Electronic supplementary material The online version of this article (<https://doi.org/10.1007/s40789-018-0213-6>) contains supplementary material, which is available to authorized users.

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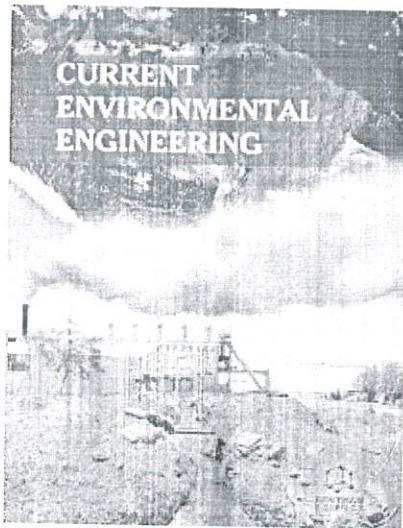
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Keywords Ash fusion temperature · Artificial neural networks · Support vector regression · Genetic programming · Data-driven modeling

1 Introduction

Coal as a feedstock is used in processes such as combustion, gasification, and liquefaction. It is a complex substance mainly comprising carbon, hydrogen, nitrogen, sulfur, oxygen, and mineral matter that can be intrinsic and/or extraneous with differing form and composition (Ozbayoglu and Ozbayoglu 2006). Being a natural resource, coal exhibits a large variation in its composition.

In coal-based processes, coal's mineral matter experiences a wide variety of complex physical and chemical transformations. These result in the formation of ash that possesses a tendency of depositing on the surfaces of the heat-transfer and other exposed process equipment



Prediction of Rate Constants of Photocatalytic Degradation of Pharmaceutical Pollutants by Artificial Intelligence based Genetic Programming Formalism

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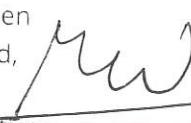
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... Abstract References Citations  Supplementary Data

Background: Personal care and pharmaceutical products affect the ambient water quality when these materials enter the environment in the form of human and animal excreted metabolites or as effluents from hospitals, pharmacies, and chemical manufacturing facilities. The stated compounds are difficult to capture and pose a serious threat to the aquatic ecosystem, and human health. Photocatalytic Degradation (PCD) is seen to be an attractive and inexpensive method, when compared to the ones such as ozonation, photo-Fenton oxidation, sonolysis, and photolysis for the elimination of pharmaceutical compounds from the wastewater.

Methods: Owing to the underlying complex nonlinear physicochemical phenomena, the design and construction of a "first principles" model for predicting the rate constant of the PCD is a timeconsuming and tedious process. To overcome the said difficulty, in this study, the stated mathematical models have been developed-for the first time-using an artificial intelligence (AI) based novel datadriven modeling method, namely, genetic programming (GP). The GP-based model predicting the rate constant of the PCD of pharmaceuticals uses following inputs: time of exposure of pharmaceutical pollutant to the solar radiation,

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pH of wastewater, concentration degraded during the measured time, and the ratio of concentration degraded to the initial concentration of the sample. In this study, PCD of three pharmaceutical pollutants, namely, Ciprofloxacin, Naproxen, and Paracetamol was studied and modeled using a single GP-based model. In the model's input space, the three pharmaceutical pollutants were differentiated using a number of attributes related to their molecular structures.

Result: The GP-based model predicting the rate constant of the PCD, proposed in this study, exhibits an excellent prediction accuracy [correlation coefficient (CC) > 0.9] and generalization performance.

Conclusion The GP-based modeling strategy introduced here can be fruitfully used in the development of models for a variety of other pharmaceutical degradation reactions.

Keywords: Artificial intelligence; N-doped TiO₂ photocatalyst; genetic programming; pharmaceutical compounds; pharmaceutical micropollutants; photo-catalysis

Document Type: Research Article

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Section Articles

Synthesis and Influence of Feret Diameter on Particle Morphology of Activated Carbon Derived from Agrowastes

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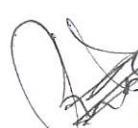
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Abstract

In this work, activated carbon was produced by chemical activation with phosphoric acid of agricultural wastes such as Areca nut shell of 180 mesh. Activated carbon is produced at activation temperature of 400 °C by slow pyrolysis. The BET surface area and iodine number surface area was calculated and compared. The FTIR spectrum showed the presence of activated carbon. Thermogravimetric analysis revealed that the activated carbon is thermally stable at 480 °C. The SEM images showed the incorporation of activated carbon particles. Surface area plot shows the details of morphological change caused by feret diameter on



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iodine number, surface area, iodine number, methylene blue number and acid adsorption value. These results proves that the feret diameter plays important role in selection of final activation temperature and impregnation ratio, and also important in determining the quality of activated carbon obtained.

Keywords:

Arecanut shell Activated carbon Phosphoric acid Feret diameter

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Table 5. Temperature of 100% *l*-Aspartic Acid

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3.344 (1) \pm 0.00117 (1) \pm 0.00162 (1)

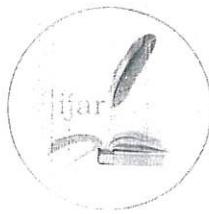
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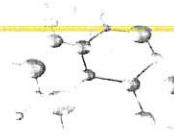
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RESEARCH ARTICLE

DISTILLERY WASTE WATER (SPENT WASH) BIOMETHANATION- WASTE TO ENERGY GENERATION.

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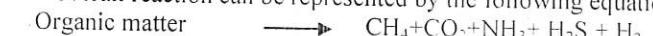
Abstract

Molasses based distilleries are classified as "Red Category" because of the large volume of high strength waste water generated by them. Pollution caused by spent wash is one of the most critical environmental issues. Spent wash is one of the recalcitrant waste having extremely high COD (120000 mg/l), BOD (60000 mg/l), SS, inorganic solids, low pH, strong odour and dark brown colour. The problem of increasing amount of spent wash generation and stringent norms has resulted in development of new technologies for its effective and economical disposal.

Biomethanation is viewed as a complex ecosystem in which physiologically diverse groups of micro-organisms operate and interact with each other in a symbiotic, synergistic, competitive and antagonistic association. The anaerobic microbial food chain consists of mainly three functionally different groups of microorganisms. Following four pathways are involved in anaerobic digestion of organic wastes

1. Hydrolysis: Hydrolysis break down macro organic materials such as carbohydrates, proteins and lipids, by incising water molecules into lower molecular weight fatty acids, amino acids and sugars.
2. Acidogenesis: Acidogenic bacteria convert fatty acids, amino acids and sugars into organic acids, hydrogen, ammonia and carbon dioxide.
3. Acetogenesis: Acetogenic bacteria convert organic acids, hydrogen and carbon dioxide into acetic acid, hydrogen and carbon dioxide.
4. Methanogenesis: Methanogenic bacteria convert acetic acid, hydrogen and carbon dioxide into methane and carbon dioxide. Readily available CO₂ is used as an electron acceptor. This reaction is slowest and the rate limiting step of the total anaerobic digestion process.

The overall reaction can be represented by the following equation.



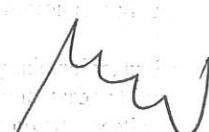
Generated methane gas is used as a fuel and cost saving by using methane in boiler or it is possible to make bottling of gas

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Life Cycle Cost Analysis of a Major Public Project

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Abstract: India is a fast growing country and being a developing nation, one of its major focuses is infrastructure development. The term infrastructure mainly refers to railways, highways, airports, bridges, ports and harbors, etc. Of these, the most important is the roadways. A country can develop only if it has a planned and efficient road network. Cost of road works involves initial costs for land acquisition, design expenses, construction of road pavement, etc. and future costs for maintenance, repairs, reworks, rehabilitation, and operation over the entire life span of the road project. It is very important to thoroughly study and analyze these costs beforehand so as to make the right investment and to avoid losses in the future.

Life cycle cost analysis is an economic tool which is used to evaluate the feasibility of the project considering various costs associated with the project over its total life span. This research paper deals with the LCCA of an existing flexible pavement to check if the money spent on maintenance and repairs is justified. This is done by the Net Present Value method of analysis. Further, a conclusion is drawn whether to continue spending on maintenance or to entirely demolish the pavement and reconstruct a new one. This paper also compares the life cycle costs of flexible and rigid pavements and suggests an economical alternative to avoid losses and improve the serviceability of the road.

Keywords: Analysis period, Construction Cost, Internal Rate of Return(IRR), Life Cycle Cost Analysis(LCCA), Maintenance and repair cost, Net Present Value(NPV)

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I. Introduction

LCCA is a cost evaluation tool which is often used at the initial phase planning in construction, and which examines all the costs associated with the project. While designing a project, a number of options are first proposed. These options may have different initial costs, maintenance costs, etc. Considering a particular alternative, LCCA helps in determining the total cost of the project for a particular life span. It includes economical examination of various alternatives that considers all of the significant costs of ownership over the useful life. Finally, the project alternative with the best economic feasibility is selected. The various costs considered in LCCA include:

- Initial costs
- Financing costs
- Maintenance and repair costs

For getting the best outcome for a LCCA, an in-depth understanding of the theoretical engineering and economics is required because input parameters in LCCA are intrinsically tentative (E.g. Analysis period, type and timings of activities, etc.). And as the accuracy of prediction of costs is very important in LCCA, any error in estimation of these costs can drastically change the final outcome. Hence, the LCCA cannot be necessarily considered to be a full proof prediction of the future. In spite of these limitations, LCCA can provide the decision-makers useful information based on which they can use limited funds in the most cost-effective way.

The basic steps involved in LCCA are:

Development of a Mathematical Model using Correlation Regression Analysis on Traffic Management at Major Junctions in City

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Abstract: This paper presents development of mathematical model and traffic management for critical junctions in city. In this research correlation and regression model are developed by knowing the factors causing traffic congestion. Initially, traffic at a junction during peak hours is counted and the factors causing congestion are found out. All the factors are rated on a scale of 1-6. These factors are then rated by the effect they do on congestion. Then, with the help of SPSS Software by IBM Correlation and Regression models are developed by taking these rating as input. The correlation coefficient gives the relation between the combination of factors affecting congestion. The regression coefficients by regression model, gives us the equation by which congestion value at any junction having same factors can be calculated. We have also suggested some remedial measures to reduce traffic congestion at these junctions.

Keywords: Correlation, Regression, Traffic congestion, Mathematical model

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I. Introduction

Representation of traffic flows is an essential adjunct to both urban and non-urban planning. Being important working tools for governments and consultants, traffic models have received a great deal of attention from academic and other analysts. Traffic flow may be treated as a fluid, without considering the individual elements, or individual vehicles may be modelled. It is necessary for some junctions to realise, design, implement and use traffic control system. In order to determine a viable model of calculus for traffic cycle, intersection geometry, traffic volumes and arrival models must be taken into consideration.

The term correlation refers to the relation between elements while the term regression is used for formulating an equation.

1.1 Nature of problem

The first task in modelling traffic on a network is to identify the reasonable routes, which do not backtrack, between each origin and destination and to identify the shortest (in terms of travel time). To develop a mathematical model on traffic management for major junctions in a city or the smooth traffic flow in the city.

II. Methodology

2.1 Mathematical model

A mathematical model is a description of a system using mathematical concepts and language. The process of developing a mathematical model is termed as Mathematical Modelling. A mathematical model may help to explain a system and study the effects of different components, and to make predictions about behaviour. Mathematical models can take many forms, including dynamic systems, statistical model, differential equations, or theoretic models.

- Correlation model
- Regression model

2.2 Correlation and Regression model

- Simple regression is used to examine the relationship between one dependent and one independent variable.
- After performing an analysis, the regression statistics can be used to predict the dependent variable when the independent variable is known.

Compressive strength of polypropylene fibre reinforced concrete

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ABSTRACT:

Concrete is the most widely used construction material in the world today. High compressive strength of concrete makes it an ideal material for structure. However its tensile strength is not good as its compressive strength. One major drawback of high strength concrete is that it is brittle. The failure will be sudden and catastrophic, particularly in structures, which are subjected to earthquake, blast or suddenly applied loads. An ideal solution to overcome the serious disadvantages of high strength concrete is to add fibres in the concrete to make a ductile material and avoid sudden failures. Incorporation of fibres in concrete has been found to improve several of its properties: tensile strength, cracking resistance, impacts and wears resistance, ductility and fatigue resistance.

Keywords : Cement ,Sand, Polypropylene Fibre

INTRODUCTION :

Portland cement concrete is considered to be a relatively brittle material. When subjected to tensile stresses, non-reinforced concrete will crack and fail. Since mid 1800's steel reinforcing has been used to overcome this problem. As a composite system, the reinforcing steel is assumed to carry all tensile loads.

The problem with employing steel in concrete is that over time steel corrodes due to the ingress of chloride ions. In the northeast, where sodium chloride de-icing salts are commonly used and a large amount of coastal area exists, chlorides are readily available for penetration into concrete to promote corrosion, which favours the formation of rust. Rust has a volume between four to ten times the iron, which dissolves to form it. The volume expansion produces large tensile stresses in the concrete, which initiates cracks and results in concrete spalling from the surface. Although some measures are available to reduce corrosion of steel in concrete such as corrosion inhibitive admixtures and coatings, a better and permanent solution may be replace the steel with a reinforcement that is less environmentally sensitive. More recently micro fibres, such as those used in traditional composite materials have been introduced into the concrete mixture to increase its toughness, or ability to resist crack growth. FRC is Portland cement concrete reinforced with more or less randomly distributed fibres. In FRC, thousands of small fibres are dispersed and distributed randomly in the concrete during mixing, and thus improve concrete properties in all directions. Fibres help to improve the post peak ductility performance, pre-crack tensile strength, fatigue strength, impact strength and eliminate temperature and shrinkage cracks.

Several different types of fibres, both manmade and natural, have been incorporated into concrete. Use of natural fibres in concrete precedes the advent of conventional reinforced concrete in historical context. However, the technical aspects of FRC systems remained essentially undeveloped. Since the advent of fibre reinforcing of concrete in the 1940's, a great deal of testing has been conducted on the various fibrous materials to determine the actual characteristics and advantages for each product. Several different types of fibres have

Comparative study of flexural strength of GFRP Reinforced beam with Steel Reinforced beam

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Abstract- Steel being widely used material used to take tension in RCC. But the fact that it corrodes with time, and the structure gets deteriorated slowly. The aggressive environment faced by the structures like marine structure, chemical plants and waste water treatment facilities etc are susceptible to corrosion and increased volume of steel leads to cracking and spalling of concrete. Which increases the repair and maintenance cost of structure to great extent. Glass Fibre Reinforced Polymer (GFRP) rebars have came out be as the alternative to steel. Various countries uses GFRP Bars as alternative to steel, and it has proved to be successful. In this paper we have studied the comparative study of both Steel and GFRP reinforced beams. Six beams of GFRP reinforced and six beams of Steel reinforced with steel being the shear reinforcement in all beams were taken, and tested for flexure, the result and conclusion of the test is tabulated below.

Index Terms- Glass Fibre reinforced Polymer GFRP, Flexural strength, Tensile strength.

1. INTRODUCTION

The corrosion problem occurs in the structures located in aggressive environments such as coastal and marine structures, chemical plants, water and wastewater treatment facilities and bridges. Corrosion of reinforcements can result in costly repairs and safety hazards. Rust from the corroded bar takes large volume than the iron from which it formed, resulting in expansive forces cracking and spalling of concrete and ultimately the failure of structure.

Millions of rupees are spent every year to replace or repair concrete structures that are deteriorated due to the corrosive effect of salt. This problem is more serious in cold climate countries, where de-icing salts accelerate the deterioration. Reported figures to repair and maintain concrete structures deteriorated by corrosion of reinforcements are horrible. The

eighth annual report of the Secretary of Transportation to the Congress of the USA reported that 40% of the 575,607 inventoried highway bridges are either structurally or functionally deficient. In Quebec (Canada) half of the maintenance budget of the Ministry of Transports is spent in repairing the concrete structures damaged by corrosion of steel. Within Europe the annual cost of corrosion has been estimated to be 1000 million pounds per year.

In areas where low electric conductivity or electromagnetic neutrality is needed, use of steel as reinforcement results in complex construction layout. Some possible areas are structures supporting electronic equipment such as transmission towers, airport control towers, hospitals, and military structures (invisibility to radar). In above structures, other suitable material can replace steel to avoid health hazard or to protect electronic equipment.

Hence, GFRP can be proved to be good alternative to steel, which is anti rust as well as have good tensile strength.

II. OBJECTIVES

1. Better cost-effective materials are needed to maintain and improve the infrastructure.
2. To study and compare the flexural behavior of GFRP reinforced concrete beams, with Steel reinforced beams with a focus on evaluating current design code provisions relating to design with GFRP.
3. Alternatives to steels and alloys to combat the high costs of repair and maintenance of structures damaged by corrosion and heavy use.

III. UNITS

All the units given in this paper are mentioned next to the given parameter.

Effect of Magnetic Water on Concrete

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Abstract- In this research, the compressive strength and workability of the concrete by using magnetized water, have improved certain percentages depending on the process of the formation of this concrete. The experiments comprise the preparation of standard cubes from this concrete according to the standard ratios of ingredients and mixed with magnetized water, which was prepared by passing tap water through the devices of different magnetic strength in terms of (4000, 6000, 9250) Gauss. Then the factors affecting some physical and mechanical properties were studied, and developed some methods to be tested and verified. To complete the scope of the present experimental results, the study was necessitated the preparation of similar cubes using ordinary tap water.

Several experiments were conducted to determine the velocity of water through the magnetic field, which gave the highest value for the compressive strength, where it was up to 0.8 m / sec. It was also appeared from the tests for compressive strength of more than 63 cubic concrete mixed with magnetic water that there is an increase ranging between (10-22%) compared to the results of the control cubes, Where the highest increase upto 22% at the magnetic intensity equal to (9250) gauss. Investigations of the slump test have shown best softness and good workability to the mix concrete in the range between (6.25-7) cm. It is compatible with a number of international standards, for this, the percentage of water to cement (w/c) was determined, regardless of the quality of water used.

Index Terms- Magnetic water, Ph Value, Compressive strength, Concrete.

1. INTRODUCTION

Concrete is made by Ordinary Portland Cement, water and aggregates. Ordinary Portland Cement is a hydraulic cement that hardens in water to form a water-resistant compound. The hydration products act as binder to hold the aggregates together to form concrete. The setting and hardening of concrete are the result of chemical and physical processes that take place between Portland cement and water called

hydration. This hydration reaction is an exothermic reaction which liberates considerable quantity of heat and this is to be dissipated for continuing hydration process. Curing is one method to provide favorable environment for an uninterrupted hydration which is essential for achieving a good quality C-S-H structure. In many parts of India at many construction sites this curing is done by immersion, ponding and spraying water on concrete surface. More than one hundred relevant articles and reports are available in the open literature regarding usage of magnetic structured water for different applications like reducing salinity in water, improving crop yield and germination in plants and many medical applications in human body. Present work focuses on use of this Magnetic structured water in manufacturing & curing of concrete. Much research in recent years has been devoted to establishing the fundamental and engineering properties of high-strength concretes, as well as the engineering characteristics of structural members made with the material. Increasing the compressive strength of concrete is an aim which most researchers are looking for, using various methods to do so, as the use of fiber reinforcement in a concrete mixture to increase concrete strength. Gopalan and Haque found that the design methods influenced the strength development of fly ash concrete significantly for structural concrete, at prevalent replacement ratios, the variation of strength of 20% has been observed. Other researchers used fly ash and combination of fly ash and silica. Vipulanandan and Dharmarajan studied strength of both epoxy polymer and polymer concrete. When fiber comes from recycle fiber which is derived from recycling of waste paper (magazine) by dry mechanical processing, the improve stiffness (possible of filler action of fines in recycled fibers) are observed [8], the damage stiffness and all aspects of flexural performance are observed, to be enhanced through refinement of fiber. Certain admixtures

Comparative Analysis of Slag Sand with Partial Replacement to Fine Aggregate

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Abstract –Slag is considered as one of the waste materials which can have a promising future in construction industry as partial or full substitute of conventional sand. For each ton of steel production, about 2.2 tonnes of slag is generated. In this paper, Slag is used as a partial replacement to fine aggregate with 30,40 and 50% respectively. Cubes and Cylinders were casted and compressive and tensile testing were noted after 7 and 28 days testing. The Cylinders casted has more tensile strength such that it has wide application in RCC work as steel requirement will be less due to good strength of slag sand used in cement. For this project, Steel Slag was used which was available from Kalika Steel, Jalna, Maharashtra. This Project was successfully completed under the guidance of CSK RMC Plant, PUNE.

Keywords – Slag sand, Partial substitute, Tensile and Compressive Test, Kalika Steel, CSK RMC Plant.

I. INTRODUCTION

The Concrete Industry is very large consumer of natural resources like sand, gravel, crushed rock, etc as building material. Environmental restrictions of sand extraction from river beds have resulted in search for alternative sources of fine aggregate, particularly near the larger metropolitan areas. The recent controversy in India over sand mining has put spotlight on the need to substitute the natural fine aggregates. Slag sand is being used as an alternative to fine aggregate which in turn leads to effective utilization of industrial by-products. In order to reduce the accumulation of steel slag and also to provide an alternative material for sand and cement an approach has been done to investigate the use of steel slag in concrete for the partial replacement of sand and cement. Many researchers have already found it possible to use slag as a concrete aggregate, because slag has similar particle size characteristics likely to that of sand. Fine grained powder of steel slag can be used as a supplementary cementing material to concrete and in cement clinker production. Although there are many studies that have been reported by investigators from other countries on the use of slag in cement concrete, not much research has been carried out in India concerning the incorporation of steel slag in concrete.

II. MATERIALS AND METHODS

The raw materials used in this research were cement, fine aggregate and coarse aggregate, steel slag, admixtures and

water. The cement used was Ordinary Portland Cement from CSK Plant, Pune. Fine aggregate and coarse aggregate was also available from the premises of CSK RMC Plant. Slag sand was sponsored from the KALIKA STEEL Plant, Jalna, Maharashtra and final raw material i.e water, normal drinking water was used for work. The physical properties of coarse fine aggregate and steel slag were determined.

TABLE 2.1
Physical Properties

	C.A	Sand	Steel Slag
Fineness Modulus	7.73	3.96	4.508
Specific Gravity	2.75	2.65	3.72
Water Absorption	0.609	1.2	4.72

The Ordinary Portland Cement Concrete was M20.

Water Cement ratio for the mix proportion is 0.47

Example Preparation

The materials utilized for making cement are OPC 53 review concrete, coarse sand of size 20 mm, fine sand of size 10 mm, water cement proportion 0.47. In this solid we utilize steel slag as a substitute of fine aggregate in different sum control stage (0%), 30%, 40% and 50%.

Curing

Curing intends to cover the solid so it remains wet. By keeping solid damp, the bond between the glue and the total gets more grounded in order to advance solidifying of cement. To help diminish water misfortune, promptly subsequent to demoulding of examples they were put in curing tank containing consumable water for appropriate curing until testing for a time of 7 days and 28 days respectively.

Test Specimens

The 24 numbers of (150*150*150) mm estimate block (cubes), 24 numbers of (150*300) mm measure chamber (cylinders) were threw for review.

Energy Dissipation in Buildings using Buckling Restrained Bracings. (BRB) – A Review

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Abstract - Earthquakes are the natural calamities which occur due to the sudden shaking of the surface of the earth resulting into the releasing of energy which causes seismic waves. A building dissipates energy either by undergoing large-scale movement or by sustaining increased strains in key building elements such as columns and beams. Both of these processes eventually result in some degree of damage. Structural engineers around the world are trying to innovate new technologies to increase the seismic performance of the structures to make it more resistant to the earthquake forces. Energy Dissipation devices are not used for supporting the structure but are used for enhancing the strength and stability of the structure. During the earthquakes, when the seismic energy passes through them these devices absorb them and thus damp the motion of building. Buckling Restrained Bracings (BRB) are one of the latest new technologies which are used nowadays to effectively dissipate the energy from the earthquakes and increases the seismic performance of the structure.

Key Words: Earthquake, seismic performance, energy dissipation, Buckling Restrained Bracings (BRB)

1. INTRODUCTION

Energy Dissipation technology is a technology to improve the earthquake resistance of structures. During an earthquake, a certain amount of energy is transferred to the building. While buildings can dissipate, or damp, this energy, the capacity to do so before becoming deformed or damaged is quite limited. Buildings are equipped with additional devices which have high damping capacity by which we can greatly decrease the seismic energy entering in the structure.

A Buckling Restrained Brace (BRB) is a structural brace in a building, designed to allow the building to withstand lateral loadings, typically earthquake-induced loading. It consists of a slender steel core, a concrete casing designed to continuously support the core and prevent buckling under axial compression, and an interface region that prevents undesired interactions between the two. Braced frames that use BRBs also known as Buckling Restrained Braced Frames or BRBFs have significant advantages over typical braced frames. Buckling Restrained Bracings (BRB) consists of four main components parts

[1] Steel Core

[2] Bond Preventing Layer

- [3] Infill Material
- [4] Casing or Wrapping

2. LITERATURE REVIEW

A review of some of the literatures done by some researchers around the world on the energy dissipation using Buckling Restrained Bracing is presented below.

In the research thesis done by John Andrew Tinker (2011), he suggested to make the Buckling Restrained Bracing lighter in weight by replacing the steel core by using high ductile aluminium core. When we replace concentrically braced systems with the buckling restrained bracing the self-weight of the structure increases as these are heavier than the conventional braced systems. This research paper suggested to use lighter yet stronger material as a replacement for the material used in buckling restrained bracing to make it lighter in weight to reduce the self-weight of the structure. [6]

In the research done by M. Bosco, E.M. Marino & P.P. Rossi (2012) the design of steel frames using Buckling Restrained Bracings. This paper highlighted the fact that no design codes (for eg:- IS 800 – 2007, Eurocode 8, etc.) are equipped with the provisions for designing earthquake resistant structures using BRBs. This paper gave the design procedure for the Buckling Restrained Bracings using a case study. [8]

In another research done by K.K. Sangle, K.M. Bajoria, V. Mhalungkar (2012) the Indian standard code provisions was used for designing the different types of bracings such as Diagonal A – Brace, Diagonal – B Brace, X – Brace and K – Brace for a G + 40 level storey building and studied the effects of earthquake on the high rise structure with and without bracings. [7]

The research done by Bin Wu, Yang Mei (2014) on the Finite Element Analysis showed the buckling mechanism of the Buckling Restrained Bracings. The development of buckling mode was obtained under increasing axial load. The formulae for the contact force and the maximum bending moment was obtained in this research paper. [1]

In the research done by Huanjun Jiang, Shurong Li, Yulong Zhuc (2016), a brief introduction is given about the Energy Dissipation and also Buckling Restrained Braces were introduced with their properties. A comparative study was

Study of Seismic Performance of Base Isolated RCC Structure using Fibre Reinforced Elastomeric Isolator – A Review

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Abstract - Conventional seismic design attempts to make buildings that do not collapse under strong earthquake shaking, but may sustain damage to non-structural elements and to some structural members in the building. This may render the building non-functional after the earthquake, which may be problematic in some structures, like hospitals, which need to remain functional during the earthquake. Special techniques are required to design buildings such that they remain practically undamaged even in a severe earthquake. Base isolation is one such techniques of designing an earthquake resistant building. The idea behind base isolation is to detach the building from the ground in such a way that earthquake motions are not transmitted up through the building, or at least get greatly reduced. It has become evident in recent times that base isolation can be very effective in the event of an earthquake. But the cost of installing base isolation system has been so great that it is for important buildings and in developed nations only. In a developing country like India, base isolation technique is as good as non-existent. Fibre Reinforced Elastomeric Isolator (FREI) is a low cost base isolation system. It is a rubber bearing reinforced with fibre instead of steel, which reduces the weight and cost of the bearings with great extent. It can also lead to a much lesser labour intensive manufacturing process. Past study shows that the behaviour of the fibre reinforced elastomeric isolator is very similar to that of the steel reinforced specimen with regard to shear deformation and dynamic and mechanical characteristics including vertical stiffness, effective horizontal stiffness and damping. Therefore, this type of fibre reinforced isolator can be used in seismic isolation of structures.

basic difference between dampers and base isolators is that dampers are provided in the superstructure while base isolators are provided between superstructure and foundation. Isolation system introduces a layer of low lateral stiffness between the structure and the foundation. With this isolation system the structure has a natural time period which is much longer than its fixed base natural time period. This lengthening of time period can reduce the acceleration and hence the earthquake induced forces in the structure.

It has become evident in recent times that base isolation is a very efficient measure to design an earthquake resistant structure but due to the cost involved in manufacturing and installing base isolation systems it is generally only used for emergency centers, historical buildings, and buildings with very expensive and sensitive equipment and is limited to developed nations only and in a developing country like India, base isolation technique is as good as non-existent. Therefore to enable its use for ordinary structures and in countries like India it is important to develop low cost devices, one such low cost device is Fibre Reinforced Elastomeric Isolator (FREI). Therefore the main focus of this study is to understand the seismic response of a base isolated RC structure where a low cost device i.e. FREI is used as a base isolation device.

2. DETAILED REVIEW

A review of some of the research done by some researchers around the world on the base isolation and on Fibre Reinforced Elastomeric Isolator is presented below.

James M. Kelly (2001) et. al. studied analytical and experimental study of fibre-reinforced elastomeric isolators. Theoretical and experimental analyses are carried out for the mechanical characteristics of multi-layer elastomeric isolation bearings where the reinforcing elements, normally steel plates, are replaced by a fibre reinforcement. The fibre-reinforced isolator, in contrast to the steel-reinforced isolator (which is assumed to be rigid both in extension and flexure), is assumed to be flexible in extension, but completely without flexure rigidity. The influence of fibre flexibility on the mechanical properties of the fibre reinforced isolator, such as the vertical and horizontal stiffness, is studied, and it is shown that it should be possible to produce a fibre-reinforced isolator that matches the behaviour of a steel-reinforced isolator. [5]

Key Words: Base Isolation, Seismic Performance, Fibre Reinforced Elastomeric Isolator.

1. INTRODUCTION

The earthquakes in the recent past have provided enough evidence of performance of different type of structures, earthquake conditions and foundation conditions to be taken as a food for thought to the engineers and scientists. This has given birth to different type of techniques to save the structures from the earthquake effects. Base Isolation is a passive vibration control system. It partially reflects and partially absorbs input seismic energy before it gets transmitted to the superstructure. The idea behind base isolation is to detach the building from the ground in such a way that earthquake motions are not transmitted up through the building, or at least get greatly reduced. The



EXPERIMENTAL INVESTIGATION OF COMPRESSIVE STRENGTH OF COMPOSITE GFRP DOUBLE SKIN TUBULAR COLUMN

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ABSTRACT

A glass fibre reinforced polymer (GFRP) concrete-steel double-skin tubular column (DSTC) consists of an outer GFRP tube and an inner steel tube, with the space in between filled with concrete. This paper focuses on the compressive strength of the glass fibre reinforced polymer and steel double skin tubular columns. Double skin tubular columns considered usually are of similar casing material on the inner as well as outer side of the column or both inner and outer tube of same shape, in this paper the never before variations taken are, the circular outer tube is glass fibre reinforced polymer tube with variations in its thickness and inner tube being of steel with variation in its shape. As obtained from results, the optimum specimen is the one which has circular cross section on the periphery and as well on the inner side, the specimens with different cross sections demonstrated less compressive strength than the specimens with similar cross sections, but more compressive strength than the control section, thus these columns can be also an optimum replacement of conventional columns. Thickness of the GFRP tube also played an important role in determining the compressive strength of the specimens, the specimens which had more thickness showed enhanced results of compressive strength as compared to specimens which had lesser thickness.

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INTRODUCTION

Double Skin Tubular Column (DSTC) is a hollow column which contains concrete section sandwiched between two tubes made of steel, FRP etc DSTC offers numerous structural benefits, including high strength and fire resistances, favorable ductility and large energy absorption capacities. This structures could also be used for utility purposes, there is also no need for the use of shuttering during concrete construction; hence, the construction cost and time are reduced. These advantages have been widely exploited and have led to the extensive use of concrete-filled tubular structures in civil engineering structures. This column might also be used for utility purposes such as to transfer cables from one floor to another without any serious structural damage to the structure thus the space in column can also be benefitted from.

In research done by Qing Quan Liang (October 2016) presents a new numerical model for predicting the structural performance of circular DCFST short columns under axial compression. The numerical model incorporates new material constitutive relationships of sandwiched concrete in circular DCFST columns. The confinement effects provided by the

outer and inner steel tubes on the sandwiched concrete in circular DCFST columns were taken into account in the numerical formulations. Comparisons with existing experimental results on circular DCFST short columns are made to verify the numerical model developed. The numerical model was used to undertake parametric study to examine the effects of important geometric and material parameters on the strength and ductility of axially loaded DCFST short columns. It was demonstrated that the numerical model accurately captured the complete axial load-strain characteristics of circular DCFST short columns under axial compression. A designing formula was proposed and is found to predict the ultimate axial loads of circular DCFST short columns. [1]

In research done by Tao Yu, Shishun Zhang, Le Huang, Chunwa Chan (March 2017) A hybrid fibre-reinforced polymer (FRP) concrete steel double skin tubular column (DSTC) consisted of an outer FRP tubes and an inner steel tube, with the space in between filled with concrete. Paper presented results from the first ever experimenting study on hybrid DSTCs with a large rupture strain (LRS) FRP tube, namely, polyethylene terephthalate (PET) FRP tube. The experimental program involving the testing of 12 hybrid DSTC specimens with or without additional concrete inside the inner steel tube. The test results confirm the ample ductility of hybrid DSTCs with a PET-FRP tube despite the severe local buckling of the inner steel tube at large axial deformations.

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**EXPERIMENTAL INVESTIGATION ON BAMBOO REINFORCEMENT IN CURVE BEAM****Chetan N. Bhatiwal and Uttam. R. Awari**

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Bamboo reinforcement, tensile strength, water absorption, shape of bamboo, density.

ABSTRACT

Concrete is the man-made material in the world. Reinforced concrete is common building material in the world, reinforcement used in concrete is quite costly. There is a cheaper reinforcing material that can be used in concrete is bamboo. Bamboo is consider as reinforcing martial as a temporary structure and scaffolding. Bamboo as reinforcing martial to concrete is an investigation in structural engineering. The experimental investigation comparison of steel reinforcement and bamboo reinforcement. Verified the mechanical properties such as tensile strength, moisture content, specific gravity, density of specimen. Curve Beam specimens of 500 mm radius and 150 mm x 150 mm cross section were cast to check the flexural strength of concrete.

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INTRODUCTION

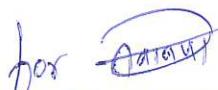
As reinforced concrete is common building material, it is important to make the development of building construction, low cost material. For developing country steel is difficult to obtain because of expensive prices and for low cost housing and temporary structure.

Many researches around the world are began to explore the use of low-cost and low-energy substitute construction material as reinforcing material to reduce the cost of construction for low cost housing and temporary structure. Among the many possibilities for such substitution bamboo, which is one of the material fastest growing plants, and it is great economical potential. It grows naturally in many parts around the world and easily available. Bamboo takes less energy to harvest and transport. Therefore, bamboo has low manufacturing costs compared with steel. Bamboo has a good tensile strength and light weight. Bamboo has a good water absorption capacity it may reduce the mechanical properties and causes the structural failure. There is need to control the water abortion of bamboo. To reduce the water absorption proper seasoning method, require.

Bamboo is able to resist more tension than compression. The fire resistance is very good because of the high content of silicate acid. Durability of bamboo is heavily depending on the preservation treatment method to control the termite and water. This preservation method includes smoking, heating, drying, coating and another method is chemical treatment.

J. G. Moroz *et al* (2014). studied masonry shear wall. In that one walls were reinforced with conventional steel reinforcement vertically and horizontally and the other walls were reinforced with different amount of bamboo reinforcement vertically and horizontally. In this bamboo is coated with varnish to waterproof the bamboo reinforcement and apply the sand to improve the bond with concrete. To prevent the cracking and shrinking, bamboo needs to be coated with water proofing material. Material that can be use asphalt emulsion, bitumen coating, anti-termite coating and varnish. [1]. S. Jeeva Chithambaram *et al*. (2017) studied the bamboo reinforced ferrocement slab panels was casted with flyash each specimen for 40 mm and 50 mm thick panels. Bamboo strips and wire mesh used as skeletal reinforcement for ferrocement slab panel. The locally available bamboo strips were used for skeletal reinforced coated with anti-termite and then protective coating to prevent it against the action of insect, fungus and water [2]. Atul Agarwal *et al*. (2014) studied the cylinder. Bond stress on different types of coating like Tapecrete p-151, Sikadur 32 gel, Araldite and anti Corr RC have been used for treatment of bamboo to study their effect on bond strength at the interface of the bamboo concrete composite. The average tensile strength was calculated 185.93 N/mm². The average bond strength between the bamboo and concrete is highest for Sikadur 32 gel as compare to other coating, most of the specimen failed due to slippage of bamboo strips from the concrete cylinder. The column with treated bamboo reinforcement sustain the comparable load than untreated bamboo [3]. Abhijeet Dey *et al*. (2018) had a comparative study of bamboo reinforced beam with various frictional properties the frictional properties of bamboo have been achieved by rolling the bamboo reinforcement with sand, G. I.

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CONFINEMENT OF REINFORCED CONCRETE COLUMN WITH UPVC

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ABSTRACT

Existing construction technology has not delivered the reliability needed. The rapid deterioration of infrastructure, especially those constructed in severe environments such as bridge piles, has increased the demand for advanced measures in building and bridge substructures. It is necessary to strengthen the concrete columns to increase their load carrying capacity. The cost of formwork was about 40% of the cost of concrete works, the rest being accounted for by labour and the cost of materials. Eliminating or reducing this formwork in construction can significantly reduce the cost of construction. The use of plastic tubes will act as a confinement material as well as a permanent formwork and this will eliminate the need for temporary formwork. Steel and FRP tubes have been widely researched on and used to confine concrete in CFT columns systems. However steel is prone to corrosion, weathering, and chemical attacks especially when used in severe environments such as under-sea piling. According to the specification the casting of short column was carried out. Then the specimen is cured for 28 days and on 28th the axial compression testing of short column on load testing machine which has capacity of 15000 kN.

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INTRODUCTION

Governments in various countries are now investing heavily to develop unique high- performance construction materials and systems. Special interest is being directed towards advanced composite materials and systems. An example of advancement into these types of new composite systems is the concrete-filled steel tube (CFST) column systems. CFSTs have been used for years as piles and columns and extensive research has been established in this area of advanced composite construction materials. However, CFSTs have the problem of corrosion of steel tubes as well as reduced confinement effectiveness at low levels of loading if the tube is also loaded in the axial direction. This is due to the fact that Poisson's ratio of concrete at low levels of loading is smaller than the value for steel. It is observed that the differential radial expansion of steel tube and concrete, at low levels of loading, results in partial separation between the two materials. This separation leads to a premature buckling of the tube. Thus, effective confinement will only be achieved at higher loading when concrete begins to crack as it expands faster than the steel tube and becomes well confined.

An alternative to CFSTs is FRP composites which have been used as precast piles, girders, and pier. As opposed to steel CFTs, Poisson's ratio of FRP tubes can be controlled through selected design of the laminate structure to providemore

confinement effect. The confining pressure provided by steel tubes is limited to a constant value once the tube yields, whereas FRP tubes provide a continuously increasing confining pressure, which adds to both the ultimate confined strength and ductility. However, with the high cost of advanced FRP composite materials, an alternative to the advanced composite materials tubing is the commercially available UPVC plastic pipes. UPVC are the pipes made of unplasticized polyvinyl chloride, which are easily obtained in various diameters. However, due to the high cost of advanced composite materials, the use of these materials in composite columns in light construction is not recommended. Another alternative to the advanced composite materials tubing would be the commercially available unplasticized polyvinyl chloride (UPVC) pipes. The strength, ductility and energy absorption capacity of new concrete columns can be enhanced by providing external confinement by employing UPVC pipe. The tubes in composite construction will be used as formwork during construction and thereafter as an integral part of the column.

Walter O. Oyawa *et al.* (2015), studied collapse of buildings during construction largely depends on the quality of in-situ concrete and poor workmanship. The situation is further compounded by rapid deterioration of infrastructure it is necessary that measures be taken to develop enhanced structural materials and systems. study clearly demonstrate the effectiveness of plastic tubes as a confining medium for infill concrete, gives enhanced composite interaction between the plastic tube and infill concrete medium. It was determined that

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Crack Detection for Civil Engineering Structures

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Abstract - Structural Health Monitoring (SHM) is one of the emerging fields in which smart technology is used to inspect the civil engineering structure components to prevent from failure. SHM will detect the fundamental properties such as cracks in the structure and expedite needed repairs, and thus increase the useful life of those components. The safety measures related to civil engineering structures with respect to age of the structure, structural damage, climatic conditions like flood, heavy rains, earthquake, etc. Is the prime role of the concerned authorized engineers. In the development of economy and society, many structures have been built which should meet the requirement of the serviceability, safety and sustainability during the operation stage throughout its life cycle. But due to some reasons the structure gets weak and cracks starts developing within the components. Gradually the crack expands which leads the structure to collapse. To avoid the failure of structure the cracks must be detected at early stage and this could be done by using piezoelectric film. Using IoT, the piezoelectric film shows the crack detection on bridge. This was major concern in our findings due to which we have made an ideology in our research to overcome this problem and to bring up safety majors in our real-life problems.

Keywords - Structure Health Monitoring, Crack Detection, Piezoelectric film, Stress, Safety, Real Time Monitoring

1. INTRODUCTION

In today's world, civil development is at its peak. Due to increasing development, thousands of new buildings, bridges, tunnels, highways, and much more challenging and complex structures are being made day by day for suiting the increasing demands of people. India is a country that has many old heritage monuments, and buildings that belong to the government or people. These heritage buildings are still standing despite thousands of years and the natural environmental conditions. It is one of the remarkable signs of integrity. Between 2010 and 2014, around 13,178 died due to the collapse of the civil structure according to NCRB.

Bridges are always at risk of failure due to corrosion of steel bars in engineering structures, increased traffic, deterioration, aging, or simple decay. Bridges deteriorate due to poor design and construction, as well as unintentional damage, resulting in loss of the load-carrying ability of bridges. As a result, many of these structures require reinforcement, repair, or replacement, yet public finances are in short supply. It is not always possible to replace or build new structures.

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A major traffic artery is a concrete bridge. It will unavoidably be subjected to severe winds, rain, snow, earthquakes, and frigid temperatures. Overloading and hitting can also cause damage to bridge piers. Cracks are difficult to spot among bridge deterioration, putting the bridge's safety in jeopardy. Large cracks can quickly jeopardise a bridge's structural integrity, causing carbonization of concrete, corrosion of steel bars, peeling of protective layers and even bridge collapse. As a result, proper measures for monitoring and preventing bridge fractures, which are vital to bridge traffic safety and smooth operation, are required. Mechanical monitoring, on the other hand, relies heavily on inspector expertise, which might lead to errors.

Visual detection is one way to detect all the crack detecting procedures. By automatically processing and analysing an enormous number of photos, a computer image processing system can detect a crack in a bridge. But this method doesn't give real-time crack detection and this may lead to structural failure.

For this reason, we are going to use a wireless sensor network for crack detection using dielectric

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CFD Modeling of Flow over Stepped Spillway - A Review

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Abstract- Hydraulic model test was used to analyze the rapidly varied flow on the spillway. But it has some error to scale and expensive cost. Khadakwasla dam in Pune was selected as the study area. The terminal structure of a spillway plays a major role in dissipating specific energy of excess flood to safeguard the river channel and downstream structure. Relationship between critical depth flow and energy dissipation are presented and discussed in stepped spillway. The numerical result is compared with experimental result. Computational fluid dynamic (CFD) software with different numerical solver methods are suitable tools for solving various engineering problems. One such CFD software tool is ANSYS Fluent. In this report, the general guide and practical steps for developing a full 3D CFD spillway model using ANSYS Fluent have been presented. The energy dissipation over this model and pressure distribution on the horizontal and vertical step faces are studied for verification purpose of CFD.

Index Terms- stepped spillway, critical depth, energy dissipation, ansys fluent, computational fluid dynamics.

I. INTRODUCTION

Stepped channels and spillways have been used for more than 3500 year. The stepped spillways can be defined as that hydraulic structure in which a series of steps of different shapes, dimensions and arrangements are built into the spillways surface at some distance from the spillways crest and extended to toe. The stepped spillways dissipates much more energy than other type of spillways. Many researches studies energy loss due to steps depends primarily on the ratio of the critical depth of flow passing over spillways to steps height (Y_c/h) and number of steps. To calculate energy dissipation of stepped spillways in the case of nappeflow (when $Y_c/h < 0.8$). Computational fluid dynamics (CFD) has the potential to provide an invaluable tool to model flow over stepped spillways. We compare the

experimental data with the modeling result deriving from shallow water and detailed stock numerical model. Hydraulic characteristics of stepped spillways can be assessed in various ways by using empirical equations (during the primary design process), scale modeling and numerical modeling (in the final design process). These three approach are applied to the stepped spillways of 'Khadakwasla dam'. As experimental are both expensive and time consuming the use of high performance computer together with further developments in computational fluid dynamics(CFD)are important in order to investigate flow over spillways using reasonable resource, time, expense.

II. LITRATURE REVIEW

BudoZindovic, LjubodragSavic (University Of Belgrade)

The comparison between the result of the scale model, empirical equations, and numerical model ANSYS FLUENT for the Bogovina dam are presented the following can be conclude : Location of the inception point is obtained with acceptable agreement for all three approaches. Uniform flow mixture depth by numerical model are predicted upstream from the position expected by empirical equations. Entrained air concentration for the uniform flow condition is significantly underestimated by the numerical model.

ChaiyuthChinnarasri (ICE)

The objectives of the present study was to simulate the flow behavior through smooth, 25 step and 50 steps spillways using a multiphase flow model with realizable k - (turbulent dissipation rate). The physical model, tested by Ward in (2002) was located in Colorado State University. For a smooth spillway, flow discharge of 0.57, 1.13, 1.70 were used. The

Development of a Mathematical Model using Correlation Regression Analysis on Traffic Management at Major Junctions in City

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Abstract: This paper presents development of mathematical model and traffic management for critical junctions in city. In this research correlation and regression model are developed by knowing the factors causing traffic congestion. Initially, traffic at a junction during peak hours is counted and the factors causing congestion are found out. All the factors are rated on a scale of 1-6. These factors are then rated by the effect they do on congestion. Then, with the help of SPSS Software by IBM Correlation and Regression models are developed by taking these rating as input. The correlation coefficient gives the relation between the combination of factors affecting congestion. The regression coefficients by regression model, gives us the equation by which congestion value at any junction having same factors can be calculated. We have also suggested some remedial measures to reduce traffic congestion at these junctions.

Keywords: Correlation, Regression, Traffic congestion, Mathematical model

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I. Introduction

Representation of traffic flows is an essential adjunct to both urban and non-urban planning. Being important working tools for governments and consultants, traffic models have received a great deal of attention from academic and other analysts. Traffic flow may be treated as a fluid, without considering the individual elements, or individual vehicles may be modelled. It is necessary for some junctions to realise, design, implement and use traffic control system. In order to determine a viable model of calculus for traffic cycle, intersection geometry, traffic volumes and arrival models must be taken into consideration.

The term correlation refers to the relation between elements while the term regression is used for formulating an equation.

1.1 Nature of problem

The first task in modelling traffic on a network is to identify the reasonable routes, which do not backtrack, between each origin and destination and to identify the shortest (in terms of travel time). To develop a mathematical model on traffic management for major junctions in a city or the smooth traffic flow in the city.

II. Methodology

2.1 Mathematical model

A mathematical model is a description of a system using mathematical concepts and language. The process of developing a mathematical model is termed as Mathematical Modelling. A mathematical model may help to explain a system and study the effects of different components, and to make predictions about behaviour. Mathematical models can take many forms, including dynamic systems, statistical model, differential equations, or theoretic models.

- Correlation model
- Regression model

2.2 Correlation and Regression model

- Simple regression is used to examine the relationship between one dependant and one independent variable.
- After performing an analysis, the regression statistics can be used to predict the dependant variable when the independent variable is known.



Study of Progressive Collapse Analysis of RCC Irregular Building

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Abstract: Progressive collapse is a series of failures that spread beyond the original local breakdown, either over the entire building or just a part of it. Buildings intended to withstand seismic events have good robustness against progressive collapse, according to the failure of structures due to progressive collapse. To evaluate its robustness, however, no in-depth studies have been done so far. So, the purpose of this research is to examine the potential resistance to progressive collapse of buildings with seismic design. In the present study High rise R.C.C. irregular building with different types of irregularities has been analyzed with and without removal of column to find out critical column. The study is done with the aid of the commercial software ETABS. Various seismic parameters like maxlimum lateral displacement, story drift ratio, time period, overturning moment etc. has been compared.

Index Terms - Progressive collapse, Irregularity, Response spectrum analysis, ETABS, Soft story, Floating column

Introduction

Progressive type collapse is a condition in which a primary structure's locally failing components, such as columns, cause the collapse of the entire structure. When a building structure has its own loading arrangement adjusted in such a way that structural parts fail as a result of loading above their capacity, this is known as a progressive-type collapse. The top structure's weight is transferred to nearby structural components when a column fails. That portion of the structure fails if these components are improperly built to disperse the additional impact load. Unless additional loading is dissipated, the structure's load-bearing components, like columns, fail. As a result, nearby sections of the building also collapsed, doing greater damage to it than the earlier catastrophe. The analytical method for progressive failure is based on the alternate load path technique, which is advised in the design and analysis standards. Since it forms the basis for the analysis of progressive type collapse, the demand capacity ratio is a key factor in this scenario. In this thesis, it is determined if a progressive form of collapse will occur or not based on the relationship between the beam's bending moment and its unfactored moment carrying capacity.

Numerous academic articles have been written on the structure's gradual collapse. Finding cures for progressive-type collapse is the goal of research on it. The contractors renovate buildings without first examining the structure; this is a modern issue with significant political and social significance. Since most Indian structures are located in densely populated areas, it is crucial to understand progressive-type collapse. A lack of knowledge about the analysis and design of structures or errors in the architects' planning are to blame for many of the structures that have collapsed over the previous 40 years. The study of the subject is crucial if you want to avoid all of these. Buildings with soft floors have been built in the last several years in response to consumer demand. Although it makes parking easier, it also makes the building more vulnerable. The use of this kind of structure is not advised by structural engineers. Any car could crash into the column while being parked, and the column could then collapse. This is extremely risky because when a column element fails, the building collapses whole, whereas when a beam element fails, the structure collapses locally. When one column fails, the pattern of loading shifts, overloading the neighbouring structural components, ultimately leading to the collapse of the building structure.

The entire planet is also at risk from terrorist assaults. A partial or complete break-down of the structure may result from a terrorist strike on the crucial column. In this instance, the collapse of one column instigates a chain reaction that finally results in the collapse of the entire structure. Progressive type collapse is the phrase used to describe the collapse of a whole structure or a significant portion of it as a result of the loss or failure of a relatively small portion of it. An uneven structural collapse is referred to as a "uneven collapse" because of how it relates to the source of the collapse. The minor structural component fails, causing the building structure to fall more massively and violently. This causes a different reaction, which causes further structural components to fall. A progressive sort of collapse is typically brought on by a variety of events. To meet the needs of modern society, structural engineers design and develop infrastructure and structures using their knowledge. Structures must be built to handle typical loads brought on by things like self-weight, human habitation, wind, earthquakes, and other loading events, according to building codes.

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DISEASE STATUS PREDICTION AND IDENTIFICATION

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Abstract- *Electronic Health Records (EHRs) are the main source of information for assessment, diagnosis, and treatment of disease in clinical care. An EHR typically contains a patient's historical health data, collected over several years of patient care. This data includes both physician's clinical notes written in unstructured text recording their observations, assessments, and plans, as well as structured data such as ordered medications, vital signs measurements, laboratory test results, and procedures conducted. The system takes input and helps the user to predict the disease. The result for the same is provided. The proposed system assists doctor to predict disease correctly and the prediction makes patients and medical insurance providers benefited. The use of EHRs are very limited when the scenario in our country is taken into account. This can also benefit the physician since the patient history will be readily available and in a structured format. Through the visits the results will be stored and a record will be maintained. Thus, our system will enhance the usage of EHR to store data as well as to predict the disease accurately and efficiently.*

Keywords- data mining; clinical decision support system; expert application; disease prediction; C4.5.

I. INTRODUCTION

Computational health informatics is an emerging research topic which involves various sciences such as biomedical, medical, nursing, information technology, computer science and statistics. Data mining techniques are applied to predict the effectiveness of surgical procedures, medical tests, medication, and the discovery of relationships among huge clinical and diagnosis data. In medical science, doctor's facilities introduced different data frameworks with a lot of information to manage medical insurance and patient information but unfortunately, data are not mined to discover hidden information for effective decision. Clinical test outcomes are regularly made on the basis of doctor's perception and experience rather than on the knowledge enrich data masked in the database and sometimes this procedure prompts inadvertent predispositions, doctors expertise may not be capable to diagnose it accurately which affects the disease diagnosis system. In health care sector, the term information mining can mean to analyze the clinical information to predict patient's health status. So discovering interesting pattern from health care data, different data mining techniques are applied with statistical analysis, machine learning and database technology.

1.1 BACKGROUND

The current status of the healthcare sector in India is associated with low public spending (1% of GDP), high out-of-pocket payments (71%), a high level of anemia among young women (56%), high infant mortality (47/1,000 live births), and high maternal mortality (212/100,000 live births), etc. India has a mixed system of healthcare consisting of a large number of hospitals run by the Central Government and State Government as well as the private sector. In general, the level of use of ICT(Information and Communication Technology) in the healthcare sector in the country has been lower in comparison to other countries. At the same time, both union and State Governments are working on several fronts to make use of the opportunities covered by ICT. Private sector hospitals are also in the process of implementing ICT projects, including electronic patient records.

Some of the corporate hospitals in India, such as Max Health, Apollo, SankaraNethralaya, Fortis, etc., have implemented integrated ICT systems in place, covering all aspects, i.e., registration and billing as well as laboratory and clinical data. Max Healthcare hospitals started implantation of EHR in its hospitals in 2009 and achieved Stage 6 level of the EMR

**Attribute based Storage to avoid duplicate files on cloud****Chinmay Patil¹, Shubham Kasabe², Ronik Mahajan³, Ajay Indani⁴, Prof. V.V. Waykule⁵**¹ Student, Department of Computer Engineering, AISSMS COE, Pune. Maharashtra, India² Student, Department of Computer Engineering, AISSMS COE, Pune. Maharashtra, India³ Student, Department of Computer Engineering, AISSMS COE, Pune. Maharashtra, India⁴ Student, Department of Computer Engineering, AISSMS COE, Pune. Maharashtra, India⁵ Assistant Professor, Department of Computer Engineering, AISSMS COE, Pune. Maharashtra, India

Abstract — Attribute-based cryptography (ABE) has been wide utilized in cloud computing wherever information{a knowledge|an information} supplier outsources his/her encrypted data to a cloud service supplier, and may share the information with users possessing specific credentials (or attributes). However, the quality ABE system doesn't support secure deduplication, that is crucial for eliminating duplicate copies of identical information so as to avoid wasting space for storing and network information measure. During this paper, we tend to gift an attribute-based storage system with secure deduplication in an exceedingly hybrid cloud setting, wherever a non-public cloud is accountable for duplicate detection and a public cloud manages the storage. Compared with the previous information deduplication systems, our system has 2 benefits. Firstly, it may be used to confidentially share information with users by specifying access policies instead of sharing cryptography keys. Secondly, it brings home the bacons the quality notion of linguistics security for information confidentiality whereas existing systems solely achieve it by process a weaker security notion. Additionally, we tend to place forth a technique to switch a ciphertext over one access policy into ciphertexts of an equivalent plaintext however underneath different access policies while not revealing the underlying plaintext.

INTRODUCTION

Cloud computing greatly facilitates knowledge suppliers UN agency need to source their knowledge to the cloud while not revealing their sensitive knowledge to external parties and would love users with sure credentials to be able to access the information. this needs knowledge to be keep in encrypted forms with access management policies such nobody except users with attributes (or credentials) of specific forms will rewrite the encrypted knowledge. An coding technique that meets this demand is named attribute-based coding (ABE), wherever a user's personal secret's related to an attribute set, a message is encrypted beneath an access policy (or access structure) over a collection of attributes, and a user will rewrite a ciphertext with his/her personal key if his/her set of attributes satisfies the access policy related to this ciphertext. However, the quality ABE system fails to attain secure deduplication, that could be a technique to avoid wasting cupboard space and network information measure by eliminating redundant copies of the encrypted knowledge keep within the cloud. On the opposite hand, to the simplest of our data, existing constructions for secure deduplication aren't engineered on attribute-based coding. Notwithstanding, ABE and secure deduplication are widely applied in cloud computing, it might be fascinating to style a cloud storage system possessing each properties.

Social Post Analysis Using Naïve Bayes and Core NLP

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Abstract: In today's world, daily there is enormous information published on the web (social media like facebook, twitter, etc). This information contains movie reviews, product reviews, blogs, news articles, etc. It is not easy to predict the kind of information to which it belongs. So in order to solve the above-mentioned issue, we have proposed the system in which when any post that contains textual information given as an input, our system tries to provide a solution from the web. To make a useful post for business, the system extracts useful information from the text. The use of the system is to take a post directly to its potential audience (online users on social media). Here, the proposed system analyses the social media posts and understands what kind of decisions the user may take in the future. So here the proposed system can recommend a solution to the user directly with a certain post. There are certain domains which we will identify from the post. Content will be suggested from the post to the potential audience (business users) and potential audience (business users) will recommend the solution or suggestion to the user.

Keywords: Core NLP, Keyword Extract, Regular Expression, Entity Extraction

Introduction:

Each and every day, there are lots and lots of contents being published on the web. After some days the post becomes useless. So we are developing a system. Our proposed system is going to be useful for social media where textual information is posted. If a blog post on a site isn't viewed by the appropriate audience, then the number of online business users on the site are useless and the sales may also be low. On the other hand, if an educational article, which is rich in content, but doesn't reach many people, then a student seeking knowledge under that particular topic will lose a good source of knowledge. This is going to be a losing situation for both content providers and content seekers.

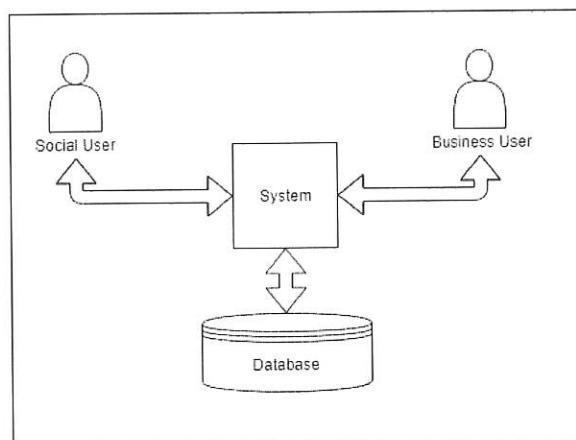


Fig. Basic Structure

Related work:

There are some researches that predict the popularity of the web content. Volume of online post, news stories would receive an Predicting textual, semantic, real-world, surface and cumulative features. Textual features denote certain discriminative terms like 'India', 'Mobile', 'Friend', etc., from each different news sources. Semantic feature denotes named entities such as locations, people, organizations, etc. Real-world features are the correlations between environmental conditions like weather conditions and commenting behaviors. Meta features like quality of the post sources and news agents are represented as surface features and the number of times a particular post is published by various news agents is denoted as the cumulative features. All these studies are about predicting the popularity of a content, but ours is mainly to derive rules to propose changes to be done to a post in order to provide a solution on the web. Also most of the features used in these studies are mainly numerical measures. But we have exploited in our study some subjective elements like emotions and sentiments. We have also incorporated intention mining in our study. Intention Mining is a novice subject area which is at its early stages of development. In our study, intention mining is used to predict whether a person is likely to watch a movie or not.

Motivation:

There are no any existing systems which work on any kind of operation on the post.

After posting content on social media, most of the posts after a certain period become useless.


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Hyper Parameters Tuning of N-gram evaluation based Machine Learning Model for Sentiment Analysis

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Abstract: Internet is used to collect huge amount of personalized information and reviews of product, films and political topic on the Web in different forms. The search engines like Yahoo and Google help users to extract the information in these reviews which is very beneficial for understanding and planning processes. Sentiment analysis or opinion mining is a powerful tool for users to take out the needful information and aggregate the collective sentiments of the reviews. It plays a vital role in Natural Language processing for determining whether given text is neutral, positive or negative. Several methods and techniques have come to the limelight in recent years for accomplishing sentiment analysis. In this paper, the text classification for sentiment analysis has been implemented using N-Gram evaluation based Multilayer Perceptron. The movie review dataset have been used for training and testing of the model. The simple process of selecting a text classification mode has attempted. For a given dataset, the goal is to find the optimal parameters of Multilayer Perceptron to achieve maximum accuracy while minimizing computation time required for training. In this experimental research work, Multilayer Perceptron have trained using different hyper parameters such as learning rate, dropout rate, epochs and number of layers of model. The experimental results show that the N-gram based model N-gram evaluation based Multilayer Perceptron perform well on N-gram based model values of hyper parameters. The model perform better on the values of learning rate 0.0001, epochs 100, batch size 512, 2 layers and dropout rate 0.4. Using optimized parameters, the N-gram based model gives maximum 90.68% accuracy on test dataset and 95.87% accuracy on training dataset. It is observed that the N-gram based model required 30 minutes to train.

Index Terms: - Opinion mining, Machine Learning, N-gram evaluation, Optimizer, Dropout rate, learning rate.

I. INTRODUCTION

Now a day, the data sources from social websites, microblogs, news articles and forums are mostly used for expressing people's feelings, opinions and feedback about specific product or different topics. These data sources can be used in stock markets, news articles or political debates for decision making. In the social network sites such as Amazon and Flipkart provides recorded customer opinions or reviews for their products or sellers. Sentiment analysis technology is used to mine the knowledge from large volume of customer opinion, reviews and comments of any product or topics. This knowledge is very useful for new buyer to choose products or sellers in different sites. Sentiment analysis is also known as Opinion Mining, was first put forward by Pang Bo in 2002, which is the process of processing, analyzing, reasoning and suggest the subjective text with emotion[1]. In other words, Sentiment analysis is the task of detecting, extracting and classifying reviews, attitudes, and opinions concerning different topics. It is also called attitude analysis, appraisal extraction, opinion mining or review mining [2]. It plays an important role in Natural Language processing which is used to determine whether given text is positive, negative or neutral. Sentiment analysis is used to understand public opinion and sentiments by a human or machine. Sentiment analysis is a difficult task due to intricate and ambiguous nature of their expression. Therefore, automation of sentiment extraction from big or complex document is a big challenge. Public opinions are usually briefly written and jargon or idiom in nature with grammatical and typo mistakes. In such content, sentiment analysis or opinion mining is comparatively difficult than regular texts [3].

There are three main categories of sentiment analysis such as document-level sentiment analysis, sentence-level sentiment analysis, and aspect-level sentiment analysis. Document-level sentiment analysis is used to categorize an attitude text as conveying a positive or negative attitude from complete text. Sentence-level sentiment analysis is used to categorize sentiment conveyed in individual sentence. It will decide whether subjective sentence conveys positive or negative feelings. Aspect-level sentiment analysis is used to categorize the sentiment using feature of objects. The customer can give dissimilar opinions for dissimilar features of the same object. Aspect-level sentiment analysis uses sources of data such as the product reviews, news articles or political debates. Aspect-level sentiment analysis plays the essential role in the selection of business decision making by analyzing customers opinions [4]. There are four main approaches of sentiment analysis: Machine learning based, Lexicon based, Hybrid approach and Concept based. Machine Learning Based Approaches uses leaning algorithm which learns from past experience and helps in predictive analysis. Lexicon Based Approaches are based on sentiment vocabulary. There are two methods of Lexicon based approaches. In dictionary based Approaches, small set of opinion words are created manually and enhanced by searching their synonyms and antonyms. In Corpus based approach, the statistical or semantic methods are used for determining emotions and sentiment polarity of words. In Hybrid Approaches, the collaboration of machine learning and lexicon is used to increase the performance. Concept Based Approaches is knowledge based. It analyzes the conceptual information associated to natural language opinion behind the multi-word expressions [5] [6]. The following is hierarchical list of different approaches of sentiment analysis.

1. Lexicon Based


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A Novel Approach to Recommend the Places by Using User's Social Media Point of Interest

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ABSTRACT: The fast development of online travel information imposes rising challenges to tourists that must prefer from several travel packages to meet their customized needs. On contrary, the travel companies understand preferences of tourists and serve-up more relevant packages. Proposed system will get social media Point of interest (POI) of user using Aho-corasick algorithm. Relevant package space including representative tags, the distributions of cost, visiting time and visiting season of each area, is mined to bridge the vocabulary gap between users travel preference and travel routes. User can view places by applying different preferences filter. User can add his own travelogue as well his photo in system. Travelogues are processed to get time, season, cost of each place. User will get recommendation on basis of collaborative filtering. Also the similar places are recommended using collaborative filtering method.

KEYWORDS: Aho-corasick algorithm, Geo-tagged photos, Multimedia information retrieval, Online interest, Social media, Travel recommendation.

I. INTRODUCTION

While, moving around the world travelling is more important. This work propose an learning algorithm called topical package model which learns users travel preferences from textual descriptions related with geo-tagged photos[8]. A set of geo tags is used to compute a location similarity model between two different territory[10]. Optimized the top ranked well-known travel sequences are recommended as per similar users travel records. The fast development of cities resulting in increasing number of POIs. Recommending POI of users according to their location and past activities. The last recommendation of POIs is derived from combination of predicted rating on content and the location of POI. Users destination recommendation are formed by comparing the query against the representative tags or images under the premise if you like that place[9]. Along with the enhancement of living standards, even middle class families could travel economically. Many travel companies, such as expedia, provide online services. On contrary, the travel companies understand preferences of tourists and serve-up more relevant packages. Thus, need for smart travel services, from both ends, that is customers and service providers is projected to raise severely. As recommended system applied to increase service quality for customers.

II. REVIEW OF LITERATURE

1. Shuhui Jiang, et al[1] By understanding package model from huge multi-source social media and community shared pictures, paper has presented a personalized travel sequence recommendation system. This system automatically mine users interest and routes travel topical preferences such as the topical interest, cost, time and season. It recommends not only POIs but also sequence of travel.

2. JungeShen, et al[2] presented the system which worked on a novel query-dependent landmark ranking system based on heterogeneous travel information fusion to facilitate a smart travel guide. With the help of text matching, this system

Comparative Study of Classification Algorithm on Heart Disease Dataset

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Abstract : Data classification is process of dividing the dataset into two or more different classes where each class contains similar type of data items. In this paper, we compare different classification algorithms using WEKA tool. Our goal is to analyze the performance of several classifiers on Heart Disease dataset. The analysis is done using six different classification algorithm. From the results of classifiers we found that KNN and J48 are the effective classifiers for medical dataset than other classifiers we have used. Weka provides implementations of learning algorithms that you can easily apply to our dataset. It also includes a variety of tools for transforming datasets, such as the algorithms for classification. You can preprocess a dataset, feed it into a learning scheme, and analyze the resulting classifier and performance.

IndexTerms - KNN, Decisiontree, Naïve Bayes, DTNB, Spegasos, Classifier

I. INTRODUCTION

Now a day different soft computing technique is widely used in medical diagnosis. The problem is medical science is in evolution in correct diagnosis as per available information form of data taken from patients. But some soft computing methods are intelligence system and are helpful for classification. For better diagnosis of diseases so many test are needed, these test required classification of large scale data. Data classification is a method of dividing data set into two or more different classes according to the data sets and data features. Features can be selected depends on datasets or application. There are so many classification algorithms in WEKA like Decision tree (J48), KNN (IBK), Naïve Bayes, Adaboost, DTNB, Spegasos etc. The dataset is first trained and then tested the data for classification .The trained data is provided as input to classification algorithm for learning the classifier and hence result are stored. For learning classifier testing data gives as an input for classification.

II. CLASSIFICATION ALGORITHM

Classification is a process of data analysis used for extracting a model for learning and making the classes of given data objects,based on that prediction will be made for oblects whose class label is unknown. The classification is done in main two steps training data and testing data. Classification model also represented using mathematical modeling KNN,Decision tree(J48) etc. Some methods of classification are described below:

2.1 Naïve Bayes :

1. Naïve Bayes(NB) is bayes therom based probabilistic classifier.
2. Naïve Bayes classifier produces probability estimates and not the predictions.
3. For each class value they estimate the probability that a given instance belongs to that class. [1]
4. It requires small amout of training data for classification and it is an advantage of this classifier.
5. In this classifier effect of one attribute value is not dependent of the values of another attributes. It is called as conditional independence.

$$\text{Product rule} \quad P(A \wedge B) = P(A|B)P(B) = P(B|A)P(A)$$

$$\text{Sum rule} \quad P(A \vee B) = P(A) + P(B) - P(A \wedge B)$$

$$\text{Bayes theorem} \quad P(h|D) = \frac{P(D|h)P(h)}{P(D)}$$

Theorem of total probability, if event A_i is mutually exclusive and probability sum to 1.

$$P(B) = \sum_i P(B|A_i)P(A_i)$$

Fig 2.1: Naïve bayes classification


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Binary Classifier For Prediction of Heart Disease Using Decision Tree

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Abstract : This research paper deals with efficient data mining procedure for prediction of heart disease from medical records of patients. Heart disease is very common disease nowadays in all populations and in all age groups. In this approach binary classifier is used for detection of heart disease using decision tree. The dataset used is Statlog dataset from UCI Repository. The J48 algorithm is used.

Index Terms - Heart Disease, Decision tree, C4.5(J48) algorithm, Binary Classifier, Classification

I. INTRODUCTION

There are several database management systems for manipulating the data, but extraction of information or knowledge from data is complex than mere data manipulation. This technique includes a number of phases: Business understanding, Data understanding, Data preparation, Modelling, Evaluation, and Deployment. Data mining has proven to be very beneficial in the field of medical analysis as it increases diagnostic accuracy, to reduce costs of patient treatment and to save human resources [1]. Data mining is a field which is a combination of machine learning, statistics, database technology. The J48 algorithm is used for classification.

2. PROPOSED CLASSIFIER

Mathematically, a classifier can be represented as a function which takes features in p dimensional search space and assigns a label vector L_{vc} to it.[8]

$$C: S_p \rightarrow L_{vc}$$

Where,

C is the Classifier which maps search space to label vectors

S_p is the p dimensional search space

L_{vc} is set of label vectors

The objective is to create ' C ' using Decision Tree. During the training phase of the classifier, samples of the form $\{X_1, X_2, X_3, X_4, X_5, X_6, X_7, X_8\} \in S^8$ and associated label vector $L_{vc} = \{\text{absence}(1), \text{presence}(2)\}$ are used to create classifier. Classification of heart data set is binary classification problem. i.e. there are only two label vector that can be assigned to each of the sample.

3. PREPROCESSING

The prediction accuracy of any classification algorithm is heavily dependent on the quantity of the data. The clinical data is generally collected as a result of the patient care activity to benefit the individual patient. So the clinical dataset may contain data that is redundant, incomplete, Imprecise and inconsistent. Not all features used in describing data are predictive. The irrelevant or redundant features, noisy data etc. affect the predictive accuracy. Hence, the clinical data requires rigorous preprocessing. Preprocessing of data is often a neglected but important stage in the data mining process.

a) Normalization : It require when the attribute values are not in specified range. It scales all the values for a given attribute such that they fall within a specified small range. It helps to avoid giving the undue significance to attributes having large range.

b) Cross validation: The standard way of predicting the error rate of learning technique given a single, fixed sample of data is to use stratified tenfold cross-validation. The data is divided randomly into 10 parts in which the class is represented in approximately the same proportions as in the full dataset.

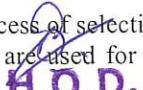
c) Sampling: It used for data selection. Processing the entire dataset is time consuming and expensive. So a sample of dataset is taken which represent same properties as the original data. The different types of sampling are simple random sampling are simple random sampling, sampling without replacement, sampling with replacement and stratified sampling.

d) Feature creation: It creates the new attribute from existing attribute. The purpose is to capture the important information in a dataset more efficiently than the original attributes. Three main methods used for feature creation are:

- Feature extraction
- Mapping data to new space
- Feature construction

e) Feature selection: In data mining, feature selection, attribute selection or variable subset selection, is the process of selecting a subset of relevant features (variables, predictors) for use in model construction. Feature selection techniques are used for four reasons:

Simplification of models to make them easier to interpret by researchers/users,

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An Improved Network-based Intrusion Detection System for Virtual Private Networks

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Abstract Use of internet increases day by day so securing network and data is big issue. So, it is very important to maintain security to ensure safe and trusted communication of information between different organizations. Because of these IDS is very useful component of computer and network security. IDS system is used by many organizations or industries to detect the weakness in their security, documenting previous attacks and threats and preventing all of this from violating security policies .Because of these advantages this system is important in system security.

In this paper we find the solution for different approaches (attacks) based on intrusion detection system. In this paper we identify different attacks and find solution for different type of attacks such as DDOS, SQL injection and brute force attack. In this case we use client server architecture.

To implement this we maintain profile of user and base on this we find normal user or attacker ,when system find that attack is present then it directly block the attack.

Keywords: DDos, SQL injection, Brute force, CFG, Scenario Attack Graph, Nice Agent

1. Introduction

Nowadays, Cloud computing is one of the top security threats in which attackers can make the use of vulnerabilities and system resources to make attacks. In cloud environment millions of users shares computing resources so such attacks are very effective.

In one system we are giving solution to multiple attacks, at different stages. This is client-server based system. Multiple clients will be connected to server and our aim is to secure server.

To protect system from Brute Force attack, if client enters wrong password more than three times we will block that client. So, this will protect the attacker from entering into the system. In DDos attack, attacker will try to flood the targeted resource using multiple computers and multiple Internet connections. In this system we are using K-means algorithm for finding malicious behavior. After finding such behavior attacker will be blocked.

In SQL injection, attacker will execute malicious SQL statements to breach the database security. Attacker can access credential data such as passwords stored in database using this attack. In our system we are providing solution to such SQL injection attack.

2. Related Work

Debajyoti Mukhopadhyay, Byung-Jun Oh, Sang-Heon Shim, Young-Chon Kim have presented a study on the recent approaches like rate limit, active filtering, defence by offence, and ip traceback for handling DDos attacks[1].Anushree, Priyanka Baviskar, Pooja Dalimbe, Sneha Dhaswadikar, S V Athawale presented a paper[2] which proposes a bundle marking plan which checks the data into packets IP header field and beats the issue of IP spoofing. The marked data is utilized to remake the IP location of the entrance router joined with the attack source at the distinguishing end. The work is given to the programmable router progressively and completion of attack source recognition systems will be done. It will improve the performance of the legitimate traffic. DDOS attack is difficult to identify at the source since the attackers to spoofed IP address. Chirag D Patel, Chirag A. Patel discusses various IP Trackback schemes to find out attacker or source of attack in their paper[3]. Olof Enqvist, Fangyuan Jiang, Fredrik Kahl derive a simple brute-force algorithm which is both robust to outliers and has no algorithmic degeneracies[4]. Their method is based on parameter search in a four dimensional space using a new epipolar parametrization. Jim Owens and Jeanna Matthews report on a study of brute-force SSH attacks observed on three very different networks: a residential system with a DSL Internet connection, an Internet-connected small business network ,and a



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Real Time Heart Behavioral Informatics System using Internet of Things

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ABSTRACT

Now a days, as many people suffer from heart disease and it becomes difficult and time consuming process to detect heart disease. so with the help of new techniques like Internet Of Things(IOT) it becomes easier and faster to detect heart abnormalities and their stages. so with the help of sensors like level sensor, heart beat sensor and temperature sensor we are monitoring patients. for detecting abnormalities we set some threshold limits and we compare them with patients monitored values. Thus with the help of this system we can reduce the death rate and patient can be easily diagnosed.

Keywords: Heartbeat Sensor, Level Sensor, Temperature Sensor, Heartbeat Monitoring, IOT.

1. PROBLEM STATEMENT

The major challenge with heart patients is difficulty in recognizing of heart related problems. These days we have an increased number of heart diseases including increased risk of heart attacks. Unfortunately, people always finds that it is too late to receive serious medical care when things are non-invertible. If early actions can be taken in time then lots of patients can be cured. so with help of advanced technologies like Iot fast and quick recognition of abnormalities related to heart rather than using old one patients get diagnosed fast and they can start the process of treatment related to heart abnormalities upon knowing stages of disease and get cured fast.

2. INTRODUCTION

Internet of Things is a latest technology which is combination of sensors actuators which are embedded in a devices and control remotely does not enquired human intervention. There are so many people in the world whose health may suffer because they do not have proper access to hospitals and health monitoring. Due to the latest technology, small wireless solutions which are connected to IOT can make it possible to monitor patients remotely.

Example: A variety of sensors which are attached to the body of a patient, and the collected data can be analyzed and sent to the server using different transmission media.

1.1 Techniques

Internet of things (IOT):

The internet of things is the network of physical object or things embedded with electronics, software, sensors, actuators and network connectivity.

Android: It is open source software platform and operating system for mobile device. It is based on Linux kernel.


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Autonomous Smart Cart

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Abstract- Human-Following robots are by and large effectively inquired about for their colossal potential to do ordinary undertakings like load conveying. We are proposing a novel technique to build up a human following automated gear utilizing Bluetooth on smartphones which can work under high obstruction condition. The proposed strategy use sensors on the cell phone to evaluate the course of human activity. Hence, the Autonomous Smart Cart which evaluates the situation of target human and course of heading and adequately will follow the individual was actualized utilizing Bluetooth. Cart incorporates a GPS, Compass and Bluetooth module that helps arrange the cart and enables you to know the co-ordinates of it consistently.

Keywords- Arduino microcontroller, GPS, Compass, Autonomous Robot, Bluetooth, Smart Phone, Cart.

I. INTRODUCTION

Automation is the utilization of machines, control frameworks and data advancements to improve efficiency in the generation of products and conveyance of administrations. It is the utilization of control frameworks and data advancements to diminish the requirement for human work in the creation of merchandise and enterprises. In the extent of industrialization, computerization is a stage past motorization. Computerized load conveying framework is presented which moves the baggage from point A to B.

Customary load conveying framework is both tedious and labour intensive. At the same time, it is a costly procedure and extremely slow. The proposed Automated System for load conveying framework can give those highlights expected to conquer the issues referenced previously. The framework comprises of robotized vehicles that can be obtained and it naturally pursues the borrower inside a foundation with baggage. In this theory we have distinguished the essential development required for the three wheels based inflexible robot body and the basic person tracking movement of the borrower for load carrying.

II. LITERATURE REVIEW

Numerous analysts have taken a shot at human following robots a summary of the work done by them is

introduced underneath. Christian Schlegel et al. have investigated on a robot with a stereo camera with real-time requirements,

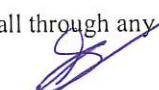
With the shifting environment, changing light conditions and shape as a measure for the individual to be followed. It was tried effectively in an office workspace. It utilizes different sensors for impact evasion however it was neglecting to particularly distinguish a man in a bunch [9]. Sarmad Hassan et al. have settled above issue by taking the colour tag to particularly distinguish the individual to pursue which essentially enhanced the execution of the following framework [10].

T. Wilhelm et al. have utilized a likewise approach as Christian Schlegel for human following issue, they combined sensor data from sonar and stereo camera to improve the execution of the algorithm which pursues the human movement [11].

Masahito Ota et al. have built up a recuperation function for vision based framework based on modelling the trajectory followed by humans while they were in the field of view. Utilizing prognostic strategies on the picture information to recognize corners in the way of human, to anticipate if the individual turned or not. They found that direction of human movement can be displayed as a logarithmic function when a human is making a turn. The test results demonstrated that robot can re-gain the target even when it loses sight of the target at the corner with distance error between anticipated position and the estimated position was under 0.65 m [12]. Shu Liu et al. have dealt with proximity estimation utilizing RSSI of Bluetooth on Smartphone and equated them with positioning strategies utilizing Wi-Fi and GPS. They report the precision of 1.5 m from the genuine position after using averaging smoothing filter on the measured values of RSSI. They additionally revealed longer battery time of Bluetooth against GPS and Wi-Fi in both Indoor and Outdoor conditions [17].

III. SYSTEM IMPLEMENTATION AND VALIDATION

The Autonomous Smart Cart will be a cart that will pursue the client all through any level surface without the need



Pothole Detection System for Monitoring Road and Traffic Conditions using IoT

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Abstract

We propose style of “Pothole Detection System for observance Road and Traffic Conditions mistreatment IoT” observance road and traffic conditions in an exceedingly town could be a drawback wide studied. Many ways are projected towards addressing this drawback. Many projected techniques need dedicated hardware like GPS devices and accelerometers in vehicles or cameras on wayside and close to traffic signals. All such ways square measure expensive in terms of financial value and human effort needed. We tend to propose a non- intrusive methodology that uses sensors gift on smartphones. In propose system we tend to use measuring instrument, GPS detector readings for traffic and road conditions detection. The projected system contains 2 vital functions, initial is to discover the hollow that is finished through a multi-sensor scheme consisting of measuring instrument and gyro and second warn the motive force and store this info on a cloud base which might be accessed by different users which is able to facilitate them apprehend the potholes on their approach. Once the placement of the potholes is understood, Government authorities may be well-read regarding identical.

Keywords: Smartphones, Artificial Intelligence, C4.5 & KNN Algorithms, Vehicle, Android application, IR Sensor

I. INTRODUCTION

INDIA, the second most developing Country in the World and a fast growing economy, is known to have the broad network of roads. Roads are most important part of the development of Country. They carry almost 90 percent of the country's passenger traffic and 65 percent of its cargo. Road is an essential part of people's day-to-day lives. It will be beneficial for all sector like transporting, traveling, import, export, etc. When a road is put into use after construction, it will increase the quality of development. This will affect the quality of driving and transportation which increase the development level of Country. It was recorded as road accident mainly occurs due to the low quality of roads. Low quality of roads is a big problem for the vehicle as well as drivers. It will also decrease transportation ratio. It will directly strike on an economy of Country. In India, 80% of the economy will depend on transportation. However, most of the roads in

India are narrow and cram-full with poor surface quality and road maintenance needs are not satisfactorily met. The traffic conditions in developing countries, like India, are more complex owing to varied road conditions, a heterogeneous mix of vehicles and chaotic traffic. Since India is a developing country there is a constant requirement for good quality transportation, infrastructure, and services. Over the last two decades, there has been a tremendous increase in the vehicle population but as per the records roads quality was not as suitable. To avoid road accidents it will be necessary that to improve road quality but as per the political system in India it is not as a possible rapid development of road quality. But as a responsible citizen of India, we have to make a solution out of it. Roads in India normally have speed breakers so that the vehicle's speed can be controlled to avoid accidents, because of our system we also have undefined potholes (formed due to heavy rains and movement of heavy vehicles) which created immediately after of completion of the road. It is a major reason for traumatic accidents and loss of human lives.

Accordingly, road surface condition monitoring systems are very important solutions to improve traffic safety, reduce accidents and protect vehicles from damage due to bad roads.[1]

Smartphones and new technology have become the most important aspects of the 21st Century. As a Google introduce their MAPS, which indicates all the routes all over the world. But it cannot indicate any bumps, potholes, etc. Poor road quality also damages mechanical strain for vehicles, increasing the need for repairs, and also increase transportation cost because of an increase of a vehicles maintenances.



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USER-LEVEL SENTIMENT ANALYSIS TECHNIQUE IN ONE GO ON SOCIAL NETWORK AND E-COMMERCE

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Abstract : Sentiment analysis is the process of identifying and categorizing opinions expressed in the text, especially in order to determine whether the writer's attitude towards a particular topic, product, etc. is positive, negative, or neutral. Sentiment analysis is an effective solution to the concentrate on modeling user-generated review and overall rating pairs. The aim is to identify linguistics aspects and aspect-level sentiments from the review data similarly on predict overall sentiments of reviews. However, systems are not very accurate at the level for determining sentiment of separate sentences.

To upset the issues in one go underneath at unified framework, we propose a totally unique probabilistic supervised joint side and sentiment model (SJASM). SJASM represents every review documents among the style of the opinion pairs, and would be possibly at a similar time model aspect terms and corresponding opinion words of the review for hidden side and sentiment detection. It conjointly leverages sentimental overall ratings, which comes frequently with on-line reviews, as supervising data, and would be possibly infer the linguistics aspects and aspect-level sentiments that are not only purposeful but collectively predictive of overall sentiments of reviews. Moreover, we collectively develop economical abstract thought methodology for the parameter estimation of SJASM supported folded gibbs sampling. We build the social network web site on its user post with attaching files, on its file topic name match with product name then recommend to user on e-commerce web site.

Index Terms - *Sentiment analysis, aspect-based sentiment analysis, probabilistic topic model, supervised joint topic model.*

I. INTRODUCTION

Sentiment analysis or Opinion mining is defined as the task of finding the opinions of user concerning specific entities. The science of sentiment analysis and opinion mining has deep root in the studies on public opinion mining has deep roots in the studies on public opinion analysis at the start of twentieth century. When an individual needs to buy a product online he or she's going to typically start by searching for reviews and opinions written by people on the various offerings. Sentiment analysis is one of the most popular analysis areas in computer science Aspect-based sentiment analysis is that there search drawback that focuses on the recognition of all sentiment expressions within a given document and the aspect to that they refer. On-line user-generated reviews are of great practical use, because:

- 1) They need become an inevitable part of decision making process of customers on product purchases, hotel bookings, etc.
- 2) They put together form a low cost and efficient feedback channel, that helps businesses to stay track of their reputations and to improve the quality of their product and services.

To design supervised unification model will benefit from the inter-dependency between 2 problems, and support them to improve one another. Inferring predictive hidden aspects and sentiments from text reviews are often useful for predicting overall ratings/sentiments of review, whereas overall rating/sentiments of text reviews will offer guidance and constraint for inferring fine-grained sentiments on the aspects from the reviews. By formulating overall sentiment analysis as a classification problem built supervised models on standard n-gram text option to classify review documents into positive or negative sentiments. Moreover, to prevent a sentiment classifier from consideration non subjective sentences used a subjectivity detector to filter non-subjective sentences of every review, and so applied the classifier to ensuring subjectivity extracts for sentiment prediction. The remainder of this paper is organized as follows.

In section 2, related work is elaborated. In section 3, methodology is described. In section 4, expected result and discussion are presented. In section 5, paper is concluded.

II. LITERATURE SURVEY

B. Liu [1] Pervasive real-life applications are solely a part of the rationale why sentiment analysis may be a well-liked analysis downside. It's conjointly extremely difficult as a IP analysis topic, and covers several novel sub problems as we are going to see later. To boot, there was very little analysis before the year 2000 in either IP or in linguistics. A part of the rationale is that before then there was very little opinion text out there in digital forms. Since the year 2000, the sphere has mature chop-chop to become one in every of the foremost active analysis areas in IP. It's conjointly wide researched in data processing, Web mining, and knowledge retrieval. In fact, it's unfold from computing to management sciences.

B. Pang, L. Lee, and S. Vaithyanathan [2] The problem of classifying documents not by topic, however by overall sentiment, e.g., crucial whether or not a review is positive or negative. Victimization film reviews as knowledge, we discover that commonplace machine learning techniques definitively surpass human-produced baselines. However, the 3 machine learning strategies we tend to utilized (Naive Thomas Bayes, most entropy classification, and support vector machines) don't perform in addition on sentiment classification as on ancient topic-based categorization. We tend to conclude by examining factors that build the sentiment classification drawback more difficult.

Sensor-less Vector speed Control of Induction motor Drives using MRAS technique

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Abstract- A model reference adaptive system (MRAS) is simplest speed estimate technique for controlling induction motor from very low to very high speed range. A reference and adaptive model is used to generate two speeds N_r and N_r^* , and its error used to control speed as per requirement. This paper presents a new sensor-less vector control scheme consisting on the one hand of a speed estimation algorithm which overcomes the necessity of the speed sensor and on the other hand two different models with the simplest algorithm. In this work, an indirect field-oriented induction motor drive with a MRAS is presented. The design includes rotor speed estimation from measured stator terminal voltages and currents. The estimated speed is used as feed-forward in an indirect vector control system achieving the speed control without the use of shaft mounted transducers with adaptive control. A MATLAB demonstration is done for a high performance of the control scheme under load disturbances and other parameter uncertainties. In order to model and simulate the electrical system, the simulation software Simulink is used.

Index Terms- Sensorless, Vector control, indirect field oriented control, Induction motor, MRAS.

I. INTRODUCTION

The field of ac drives has experienced an explosive growth in recent years and its demand reaches at the peak as additional services are being added to existing infrastructure. The control and estimation of induction motor drives constitute a vast subject, and the technology has further advanced in recent years. Induction motor drives with cage type machines have been the workhorses in industry for variable speed application such as includes pumps and fans, paper and textile mills, subway and locomotive propulsion, electric and hybrid vehicles etc. The control and estimation of ac drives in general are considerably more complex than those of dc drives. Vector control

is efficient and effective way of controlling speed of 3phase Induction motor drive [1-6].

An indirect vector control of induction motor is a feed-forward control here a motor speed is estimated using various techniques from motor terminal voltages and current. A speed sensor is eliminated due to finite number of limitations such as prone to noise, shaft mounting arrangement, expensive etc. The induction motor is most widely used motor, and in varied applications a desire for high dynamic performance in wide speed range is necessity. The sensorless vector control with speed estimation techniques is the best solution for this situation. The simple yet robust control is another basic need. Thus, MRAS system is boon having two controllers with easiest algorithm.

In recent literature, many researchers have carried out the design of sensorless vector of IM drives based on the Model reference Adaptive Scheme, Extended Kalman Filter, Luenberger Observer, also Artificial Neural Network [7-14].

This paper presents the Model reference adaptive system (MRAS) for sensorless speed control using MATLAB simulations, and results for various speed and torque is discussed. MATLAB Simulink software is used for simulation of this model.

II. MODEL REFERENCE ADAPTIVE SYSTEM

The good result and ease of implementation has diverted users most attention to MRAS, out of all the available methods; sensorless vector control of induction drives. There are number of advantages of MRAS sensorless control such as; Wide speed range from very low to very high speed, high dynamic performance of drives in steady state as well as transient states, robust to parameter variations, simpler algorithms and cheap running cost etc. The MRAS makes use of two independent machine

Musical Instrument recognition using LPC and K-nearest neighbour classifier

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ABSTRACT: Now a days the demand for online access to music data is increasing day by day. The need for proper searching for multimedia data on internet has become a major challenge in intelligent browser in internet search engine. Musical instrument recognition helps in proper searching of musical data on internet.

In this paper, the problem of recognizing and classifying of musical instruments is addressed. The musical instruments are classified using linear predictive coding features and KNN classifier. The proposed system is tested with 19 Musical instruments from String, Percussion, Brass and woodwind family. The proposed system gives accuracy of 75.67% for individual instruments and 78.5 % for instrument family.

Key Words: Musical instrument classification, LPC, KNN, Feature Extraction.

I. Introduction

In this research work a computer system will listen to musical note played and recognize the type and family of musical instrument. The various applications of musical instrument classification systems are automatic indexing, Musical Information Retrieval, Musical content analysis and database retrieval.

Music is not only used for entertainment and for pleasure but also for wide range of purposes due to its social and physiological effects. Efficient and accurate classification of musical instruments has become an important issue in music search. Human beings have natural ability to recognize and classify sounds in a variety of situations. The ear collects sound and presents it to the brain for processing. The human brain recognizes and classifies this sound after processing this information. Some of the questions which remain unanswered in recognizing sounds by human brain are: How and what kind of information does the brain receive from human auditory sensory organs? Which features are crucial and which are redundant or even which do cause confusion in the recognition and classification process?

Though computer systems are used to recognize sounds with the help of extracted features, none of the systems has come close to the recognition ability of humans. So the problem of musical instrument classification remains an open problem.

This paper is organized as follows. Introduction is given section I, a review of related work is described in Section II. Proposed method is covered in Section III and Section IV deals with Result and conclusion.

II. Literature Review

Brown et al. [1], [2] built classification system using cepstral coefficients which are based on the constant-Q transform. K-means classifier is used to differentiate between oboe and saxophone. An error rate of 15% is observed in this work. Martin and Kim [3] designed a system which identified 15 musical instruments. The test and training samples were recorded with the help of different instruments. The authors observed an error rate of 28.4%. Further, Marques and Moreno [4] used SVMs and Gaussian Mixture Models (GMMs) for instrument identification and observed recognition accuracy of 70% for 8 instruments. The different instruments used are clarinet, piano, bagpipes, violin, flute, organ, harpsichord and trombone. Consequently, Eronen and Klapuri [5], used cepstrum coefficients features with other 21 features such as spectral spread centroid, rise and decay time, frequency & amplitude modulation rate, and fundamental frequency for classification of instruments. The author reported an accuracy of 75-80% for 30 instruments playing a single note. Later, Eronen [6] used a wider range of feature vectors, which included both MFCC, LP 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 a novel feature extraction technique for classification of musical instruments using Fractional Fourier Transform (FrFT)-based MFCC features. The Counter Propagation Neural Network (CPNN) has been used as classifier. The discriminating capability of the proposed features have been increased for between-class and decreased for within-class instruments.

Online Analysis of Handwriting for Disease Diagnosis: A Review

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DOI: <https://doi.org/10.14419/ijet.v7i3.22802>

Keywords: Handwriting Analysis, Handwriting Features, Tablet, Disease.

ABSTRACT

Background/Objectives: Handwriting is an action governed by brain like any other action. This process is usually unconscious and is closely tied to impulses from brain. Any kind of disease affects the kinetic movement and reflects in subject's handwriting. To understand the health and mental problems, it is important to focus on how subject writes instead of what subject writes. This also makes the process of handwriting analysis independent of any language. Handwriting analysis is a pseudo-science used to study physical and behavioral characteristics of handwriting. In this paper, the general approach used for the disease diagnosis based on digital handwriting analysis has been presented. The research work carried out to diagnose diseases such as Alzheimer, Mild Cognitive Impairment, Dysgraphia, Schizophrenia, Autism, Parkinson's disease and Mental illness based on digital handwriting analysis has been reviewed in this paper. The features related to motion, time and pressure have been used for diagnosis of disease. The experiments and results are also summarized in this paper.

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Massive MIMO: Fundamentals and Challenges for 5G

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Abstract: In this paper we have discussed about 5G and its advantages, a probable architecture for 5G and some challenges in 5G. The main technology that maybe used in 5G are massive MIMO, millimeter wave communication, device to device communication, beam division multiple access etc. In this paper we have discussed about massive MIMO, channel estimate in massive MIMO, beam division multiple access technique to be used in massive MIMO, antenna selection in massive MIMO, capacity and energy efficiency in massive MIMO.

Index Terms: MIMO- Multiple-Input Multiple-Output, TDD-Time Division Duplexing.

I. INTRODUCTION

4G is proving good speeds up to 1Gbps. Then why do we need anything more [1]. The problem is that it is not able to provide real time applications. 5G is the name given to the next generation of mobile data connectivity. It will definitely provide great speeds between 10Gbps to 100Gbps and it will have enough capacity. But the thing that separated 5G from 4G is latency; the latency provided by 4G is between 40ms to 60ms, whereas in 5G it will provide ultra-latency between 1ms to 10ms. The standards for 5G will be set till 2020 and it will be applicable by 2022/23. In this paper we have discussed about 5G and its advantages, a probable architecture for 5G and some challenges in 5G [7]. The main technology that maybe used in 5G are massive MIMO, millimeter wave communication, device to device communication, beam division multiple access etc. In this paper we have discussed about massive MIMO, channel estimate in massive MIMO, beam division multiple access technique to be used in massive MIMO, antenna selection in massive MIMO, capacity and energy efficiency in massive MIMO. In future 5G is going to be a technology which will be invisible [3], I will be just there everywhere just like electricity. It is a very good area for research as standards and frequency band for 5G are yet to be standardized [2].

II. ORIGIN OF RESEARCH PROBLEM

Mobile networking is a wireless technology than can provide voice and/or data networking, through a radio transmission. Mobile phone is one of the most famous applications of mobile networking. In past circuit switching was used to transmit voice over a network, then we moved on to use both circuit-switching and packet-switching for voice and data, now presently we are using packet switching only, this is how spectrum has expanded from 1G to 4G. Today and in upcoming future wireless networks need to be improved for meeting the demand for increased data rate, improved capacity, reduced latency and good quality of service. We are in the 4th generation of wireless communication, so now research is going on for developing new standards for the next generation beyond 4G i.e. 5G. With increasing demands of subscribers definitely 4G will be replaced by 5G with the help of some advanced technologies like massive MIMO, device-to-device communication, millimeter wave communication, Beam division multiple access in massive MIMO etc. [3]. The technologies used in 4G like High-Speed Packet Access (HSPA) and Long Term Evolution (LTE) will be used as a part of future advancement. For this advancement we may use different methods, It may happen that we may use different spectrum access technique, increased frequency range, deploying large number of antennas etc. This whole thing started in 1970s, till now the mobile wireless communication has come a long way from analog communication to today's modern digital mobile communication providing the subscribers with improved data rate of megabits per second over wide area and few hundreds of megabits per second in a local area. We are going on well toward next stepping stone in future i.e. 5G. It is predicted that 5G will be in operation by 2020, hence immense research is going on in this field. The world is imagining a future where there is no restriction to the access and sharing of information from anywhere by anyone [1].

III. HOW MASSIVE MIMO WORKS

In Massive MIMO, TDD operation is preferable. During a coherence interval, there are three operations: channel estimation (including the uplink training and the downlink training), uplink data transmission, and downlink data transmission. A TDD Massive MIMO protocol is shown in Figure 3.1.

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Abstract

An approach to predict hypertension based on handwritten manuscript

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Background/Objectives: Hypertension is leading cause of deaths all over the world as it leads to heart, kidney and brain damage. Most of the Indian population is not health conscious. Around 58% urban and 75% rural Indians are not aware of their hypertensive status. As per survey in 2013, there is increase of 138% in deaths due to hypertension in India in comparison with number of deaths in 1990. This paper presents an approach for predicting hypertension using handwritten manuscript which is based on science of handwriting analysis. Handwriting analysis is the ancient science which is used to predict personality, emotional state and health conditions of the writer. As per the science of handwriting analysis, the handwriting strokes of the person remains same throughout the life. Handwriting is recognized as being unique to each individual. It is not related to gender and age. Handwriting analysis is used to understand PRE-ILLNESS warnings which appear in the handwriting much before the disease symptoms can be detected by any modern equipment or tests. In this paper, an approach for predicting hypertensive people based on handwritten manuscript is presented. The proposed system extracts eighteen writing features such as Euler number, number of right and left slant lines,

https://www.researchgate.net/publication/329622359_An_approach_to_predict_hypertension_based_on_handwritten_manuscript

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Synthesis and physicochemical properties of doped nano oxides-dilute magnetic semiconductors

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Abstract

Doped nano oxides based dilute magnetic semiconductors such as $Zn_{0.97}Fe_{0.03}O$, $Ce_{0.8}Nd_{0.2}O_2$, $Sn_{0.99}Mn_{0.01}O_2$, $Ni_{0.99}Fe_{0.01}O$, and $\gamma-Fe_2O_3$ have synthesized by the chemical coprecipitation method. These powders have been characterized with respect to compositional analysis (ICPES and EDAX), structural analysis (XRD), morphology (TEM), semiconducting properties (d.c. electrical conductivity, thermoelectric powder, and Hall effect measurements), dielectric properties and magnetization measurements (VSM and SQUID magnetometer). A slight decrease in the lattice parameter has observed for all compounds. The SAED pattern exhibited the lattice planes which indicate that the particle is crystalline with no defect. The infrared spectra of these compounds reveal two absorption bands associated with the stretching and bending vibrations. From TEM images, the average particle size of these oxides has found between 10 to 81 nm, which confirmed the nano-sized oxides have formed. The temperature of conductivity for all doped nano oxides showed a definite break which corresponding to extrinsic to intrinsic semiconducting properties. Thermoelectric power (TEP) and Hall effect measurements for all compounds are found to be n-type semiconductors. Magnetization measurement at room temperature gave a typical hysteresis loop for all compounds except $Sn_{0.99}Mn_{0.01}O_2$, indicating room temperature ferromagnetism. The observed magnetism is due to the exchange interaction between the defect and magnetic dopant ions. The $Sn_{0.99}Mn_{0.01}O_2$ sample showed to be antiferromagnetism. The zero-field cooled and field-cooled magnetization measurement in temperature range 5–325 K at 100 Oe confirmed the coexistence of magnetic coupling in the sample.

1 Introduction

In the field spin plus electronics, semiconductors can be developed with ferromagnetically polarized carriers at room temperature. This can be obtained by the coupling of spin and the charge of carriers with an external magnetic field to control devices. Such semiconducting materials called diluted magnetic semiconductor, which can operate at room temperature. [1, 2]. The magnetic semiconductors such as ZnO , TiO_2 , NiO , In_2O_3 , CeO_2 , and SnO_2 was produced by doping with transition metals [3–20]. These materials

showed room temperature ferromagnetism. The observed ferromagnetism in some oxides was due to the segregation of metallic clusters, while in another case, it was due to the transition metal with various valence states.

The recent research on magnetic semiconductors has been a focus on point defects such as oxygen vacancies and their link to ferromagnetic [4, 21, 22]. It was assumed that oxygen vacancies form donor impurity band assist in establishing exchange coupling in the host semiconductor oxides such as ZnO , NiO , SnO_2 , etc. [4, 23]. Besides this, some dielectric material CeO_2 is also found to show the room temperature ferromagnetism [24, 25]. In such material, the exchange mechanism is expected to be different from that in the magnetic semiconductors.

Recent successes [26–31] in nanocrystalline dilute magnetic semiconductors doped with magnetic ions showed a considerably improved the magnetic as well as electrical properties.

In this paper, we have given much attention to synthesize various doped nano oxides-dilute magnetic semiconductors using the coprecipitation method under controlled

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Synthesis and characterization of curcumin loaded nano-emulsion

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ABSTRACT:

Curcumin is a natural polyphenolic compound with potent anticancer, anti-inflammatory, and antioxidant activities. However, the solubility and bioavailability of curcumin is less as compared with the traditional mechanical methods, ultrasound is a superior tool to obtain nanoemulsion with smaller and homogeneous globule size and physical stability. The goal of this study was to develop a curcumin nanoemulsion by ultrasonication, containing a high curcumin load, small droplet size and good physical stability. The composition and preparation method effects on entrapment efficiency, droplet size, polydispersity index, and zeta potential of the nanoemulsions were evaluated. Curcumin nanoemulsions were successfully prepared by combined thin-film hydration emulsification and ultrasonication methods, the this method 8- 10 % oleic acid was used in the form of oil phase where as 1% mixture of surfactants (Tween 20 and Span 20) was use as a aqueous phase. The stable emulsions are isolated after centrifugation and micelle size of nano-emulsion was measured by using particle size analyzer and zeta potential also measured.

Keywords: curcumin, nano-emulsions, emulsification, ultrasonication, surfactants.

Introduction

Curcumin, the bioactive component obtained by the extraction and purification of ground rhizomes of Curcuma longa has been found to exert wide range of beneficial biological and pharmacological activities including antioxidant, anti inflammatory, antimicrobial and anticancer in clinical trials [1]. But studies addressing the metabolism and uptake of curcumin had shown that either no curcumin or little amount was detected in serum or tissue after administration. The main reasons attributing to the low bioavailability are supposed to be the poor solubility of curcumin in aqueous media, rapid hydrolysis followed by molecular fragmentation at physiological pH and inactivity of its metabolic products. To improve the bioavailability of curcumin, numerous approaches have been undertaken by many researchers including, preparation of nanocurcumin, liposomal curcumin, curcumin phospholipid complex, and chelation with metals micro / nano encapsulation technology of poorly water soluble bioactives has attracted wide attention in the food and pharmaceutical industry for the past few years for various applications like protection of bioactivity and their controlled release for improving bioavailability[2]. The encapsulation of polyphenols overcome the drawbacks of their instability, alleviates unpleasant tastes or flavors, as well as improves the half-life of the compound in vivo and in vitro.

The use of surfactant mixtures is a common practice in the industry and it has been extensively studied by many researches. Combining two or more surfactants in a formulation may be beneficial, not only for the reduction of interfacial tension already mentioned (leading to smaller droplet sizes for the same energy expenditure) but for the decrease of the overall surfactant concentration required to produce stable emulsions, as opposed to single surfactant systems. [8,9] Using the a forementioned approach, a nanometric droplet size minimum is attained and the corresponding formulation is used to develop a mixing procedure using a high-shear, thin film-spinning device[10]. The thin film-spinning (TFS) apparatus has impellers that spin a film of the fluid to the walls of a cylindrical vessel at very high speed, and under cavitation-free conditions. The resulting flow field induces a very high shear and droplets of the dispersed phase are fast and efficiently reduced in size. These apparatus can handle high throughputs; the small model used in this work may produce up to 40 kg/h using a 15 mL vessel and a 25 cm × 30 cm footprint.

Organic & Supramolecular Chemistry

pH Dependent Self-Assembly of Single-Pyrene-Armed Calix[4]arene: Modulation and Complexation with *p*-Sulfonatocalix[6]arene

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The photophysical behaviour of a single pyrene substituted calix[4]arene derivative (MPCX4) has been investigated, as a function of pH, using steady state fluorescence and time-resolved emission spectroscopic techniques. An interesting dimer emission band has been observed exclusively in the alkaline solution ($\text{pH} > 8$) which has been attributed to the hydrophobic and stacking interaction between the pyrene moieties of the adjacent MPCX4 molecule. The self-assembled

MPCX4 is disrupted by the introduction of another calixarene based host, *p*-sulfonatocalix[6]arene (SCX6), which eventually leads to the 1:1 complex formation between MPCX4 and SCX6, which is further characterised by ¹H NMR, FT-IR and HR-MS techniques. This complexation between MPCX4 and SCX6 also leads to the modulation of the prototropic equilibrium of MPCX4.

1. Introduction

Externally controlled and noncovalently linked supramolecular host-guest assemblies are being projected as an advantageous approach over traditional synthetic methods towards a wide spectrum of applications, such as, targeted drug delivery,^[1] on-off sensors,^[2] increased solubility of hydrophobic compound,^[3] drug receptor in biomedical field,^[4] protein complexation and detection of amino acid,^[5] in crystal engineering,^[6] dye receptor to study biological activity^[7] etc. Over the last two decades, several macrocyclic host families such as calix[n]arenes^[8] ($n=4-8$), cyclodextrins,^[9] cucurbiturils,^[10] *p*-sulfonatocalixarene,^[11] crown ethers^[12] and, more recently pillar[n]arenes^[13] have been extensively employed as receptor for various chemical species,

to understand the properties of these noncovalently linked supramolecular assemblies, and for enhancing the prospect of these functional assemblies towards better applications. Among these macrocyclic host molecules, calixarene has been recognized as one of the most versatile receptor for various neutral or ionic species owing to its diverse attractive attributes such as its structural conformation, π -electron rich cavities, high water solubility and low biological toxicity.^[14] The rims of *p*-sulfonatocalix[6]arene are hydrophilic while cavity is hydrophobic in nature with size of 7.4 \AA .^[15] Since calixarene possesses π -rich cavities, the binding interaction between the calixarene and the guest is predominantly guided by the hydrophobic interaction, CH- π interaction, π -stacking interaction along with electrostatic interaction.^[16]

Further, the easy derivatization at the lower and upper rims of calixarene provides a plethora of effective receptors for selective binding of various important analytes. Apart from adding different functional groups at the calixarene rims for the efficient binding of a targeted species, the calixarene rims can also be facilely decorated with the fluorophore moieties.^[17] The ability of such functionalization of calixarene rim with fluorophores provides an inherent advantage for easy monitoring of binding event of exogenous species to the calixarene, which can be tracked by monitoring the emission features of the attached fluorophore. This leads to their application in fabricating fluorescence sensor for metal ions and various environmentally relevant species.^[18] In this regard, pyrene is established as one of the very useful fluorogenic moiety due to the distinct emission property observed for its various molecular forms such as monomers, ground state aggregates, and excimer, both in partially overlapped and sandwiched form. Besides this, pyrene also displays high sensitivity, high quantum yield, distinct vibrational fine structure, and distinct fluorescence life time^[19] for excimer and monomer form, which

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Numerical analysis of three lobe hydrodynamic journal bearing using CFD–FSI technique based on response surface evaluation

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Abstract

This work is continuation of the earlier work published on an analysis of plain cylindrical journal bearing using CFD–FSI technique. Here, the technique is applied to analyse three lobe journal bearing. The numerical simulations were carried out using ANSYS Workbench® software. The hydrodynamic pressures were computed using computational fluid dynamics (CFD), and structural deformations were estimated using structural module. The fluid pressure forces and displacements were transferred via inbuilt transfer interface available in the software. The optimization of the journal bearing position was carried out based on response surface optimization. The numerical results were compared with experimental results which were 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 in order to study effect of eccentricity ratio and speed on static pressure distribution in the bearing. 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. The uncertainty analysis of the experimental results was also carried out, and all the results were found in expected range of pressure.

Keywords Three lobe bearing · Uncertainty analysis of bearing · Fluid structure interaction · Optimization of bearing · Response surface analysis

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 (m)
h	Film thickness (m)
I	Unit tensor

L	Length of the bearing
P	Static pressure (Pa)
R	Radius of the shaft (m)
t	Time
W	Load carrying capacity (N)
O'	Bearing centre
O	Shaft centre
ρ	Fluid density (kg/m^3)
μ	Fluid viscosity (Pa s)
ω	Angular velocity (rad/s)
χ	Lobe angle ($^\circ$)
ϕ	Attitude angle ($^\circ$)
θ	Angular coordinate ($^\circ$)
θ_p	Angle from the + ve X -axis to the minimum film location for a pad
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
M_s	Structural mass matrix

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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

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)
$\bar{\tau}$	Stress tensor
ϕ	Attitude angle (°)
χ	Lobe angle
ω	Angular velocity (rad/s)

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ORIGINAL ARTICLE

Multiphase flow analysis of hydrodynamic journal bearing using CFD coupled Fluid Structure Interaction considering cavitation



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KEYWORDS

Multiphase flow;
Journal bearings;
Fluid Structure Interaction;
Cavitation;
CFD;
Optimization

Abstract In this study, a fully three-dimensional CFD analysis and multi-phase flow phenomena, has been successfully implemented for simulation of hydrodynamic journal bearing considering the realistic deformations of the bearing with Fluid Structure Interactions (FSI) along with cavitation. Mixture model is used to model cavitation in the bearing and parametric modelling is used for modifying the flow domain due to deformation. Both systems are coupled and design optimization based on multi objective genetic algorithm (MOGA), is used to obtain optimized solution of the attitude angle and eccentricity for the combination of operating speed and load. In the study of bearings with and without effects of cavitation, it is observed that maximum pressure values drop when cavitation is considered in the bearing. Also there is decrease in maximum pressure when elastic deformation in the bearing is considered. The oil vapour distribution goes on increasing with the increase in shaft speed, thus lowering the magnitude of the pressure build up in the bearing. Multiphase study of bearings with cavitation hence becomes extremely important in case of bearings operating with higher speeds. The experimental data obtained showed very good agreements with numerical results and considerable reduction in computation time is observed.

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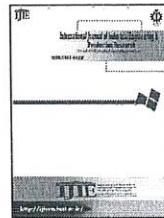


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1. Introduction

Hydrodynamic journal bearings are widely used due to their simplicity and better damping characteristics in high load, high speed and high precision applications such as gas turbines, electric generators, marine propellers, hydro turbines, IC Engines, hard disk drives and turbo generators. The traditional method for hydrodynamic journal bearing analysis usually applies the lubrication theory based on the Reynolds equation (Brizmer et al., 2003; Buscaglia et al., 2005; D'Agostino and





Exploring Biodynamic Response (Apparent Masses) of a Seated Human Body Exposed To External Excitation in Vertical Direction

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KEYWORDS

Anthropometric data;
Biodynamic model;
Stiffness;
Damping co-efficient;
Apparent mass.

ABSTRACT

The injuries inflicted on a human body are due to the impact of vibrations. In the present work, the biodynamic response behaviors of seated human body subject to vibration in the vertical direction have been extensively examined. The biodynamic response parameter of seated human body has been analyzed in terms of apparent mass (AM). The AM describe “to -the -body” force motion relationship at the interface of human and seat. The present work proposed the six degrees of freedom (6-DOF) analytic biodynamic model of the seated human posture with the backrest in the vertical vibration direction to study the biodynamic response of various masses, stiffnesses, and the damping coefficients. Field test was carried out using a TATA Nanocar to verify the vibrational comfort. The tests were carried out on different surfaces and at different speeds. Acceleration was measured on both seat and head. This paper helps analyze and provide the vibrational comfort to the car driver and the passengers in different road conditions. The present work helps the researchers worldwide to study and analyze the impact of mass, stiffness, and the damping coefficient on the apparent mass.

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1. Introduction

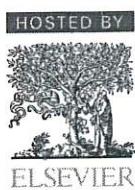
The biodynamic responses of the human body provide us with an understanding of how vibration transmits through the body and, also, contributes to understanding the effects of vibration on comfort, health, and performance. Biodynamic responses are of two types, i.e., “to-the-body” responses and “through-the-body” responses. Driving Point Mechanical Impedance (DPMI) and Apparent Masses (AM) are the “to-

the-body” responses. Seat-to-Head-Transmissibility (STHT) is the “through-the-body” response. The transmission of vibration to the body by seating and other non-rigid structures is dependent on the biodynamic responses of the body. The biodynamic responses of the human body to low-frequency vibration are nonlinear. As explained by Zhou and Griffin (2014), with a transverse excitation of the body, the principal resonance frequency decreases if the magnitude of the vibration excitation increases. This nonlinear softening effect has been found with both random and sinusoidal vibrations.

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Full Length Article

Modeling and prediction of WEDM performance parameters for Al/SiCp MMC using dimensional analysis and artificial neural network



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ABSTRACT

In the present work, The CNC wire electrical discharge machining (WEDM) of Al 2124 SiCp (0.15,20) Metal Matrix Composite (MMC) is analysed by using dimensional analysis approach (DA) & artificial neural network (ANN). The models are formulated to correlate the independent parameters such as pulse on time, pulse off time, wire feed rate, current, voltage, thermal conductivity of the work piece material, coefficient of thermal expansion, density and the wire tension with the dependent parameters surface roughness and the material removal rate through design of experiments (DOE) plan. From the experimental findings, it has been observed that the pulse on time, thermal conductivity, coefficient of thermal expansion, wire feed rate and the wire tension are the most influencing parameters. In order to find out the accuracy of the formulated DA and ANN models, correlation coefficient (R^2) was calculated. From the R^2 values, it was clear that both DA and ANN approaches are competent to predict the surface roughness and the material removal rate. In addition, the models formulated by using ANN approach were found to be more reliable than the DA approach. The higher values of R^2 (99.9910%) and lower value of various error based parameters shows the adequacy and reliability of the DA and ANN models. Comparative study of DA and ANN models disclosed the accuracy of ANN models hence recommended.

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1. Introduction

Computer numerical control (CNC) WEDM of Aluminum 2124 and Silicate carbide 0-20% (AlSiCp 0-20) have been presented in this work. Al2124 is the nonferrous aluminum alloy, which is having a wide range of engineering applications. Silicon carbide is having a high hardness, low thermal expansion, good resistance at higher temperature etc. It is used for the high power and the higher voltage application. Hence the Al base metal matrix composite with 0, 10 and 20% SiC (By weight) is selected for the investigation. WEDM plays a considerable role in the micromachining of the conductive material. Nowadays, WEDM is a very precise and accurate machining process which is accepted worldwide.

The most considerable response variables in WEDM are surface quality and the material removal rate achieved and the material removal rate. Pulse on time, pulse off time, wire feed rate and the input current are the parameters which influence the WEDM performance. Bobbili et al. [1] analyzed the impact of influencing parameters on the response parameters i.e. MRR and the Ra by

applying the DA approach and the ANN approach. Saha et al. [2] studied the presence of nano particles in the hard facing material for the improvement in the equipment performance and its reliability. They applied the grey relational analysis (GRA) coupled with the principal component analysis (PCA) for the multi response optimization. Abraham et al. [3] employed friction stir processing to fabricate the aluminum based metal matrix composite (MMC). Sharama et al. [4] used brass wire electrode for the machining of High strength low alloy steel. They applied response surface methodology (RSM) for the analysis and modeling point of view. Multi response optimization is carried out by the use of genetic algorithm. Senthilkumar et al. [5] used grey relational fuzzy grade technique coupled with the Taguchi method to analyze the impact of machining process parameters and the carbide inserts approach angle on the responses such as surface roughness, material removal rate and the tool wear near the flank face. Ulas et al. [6] evaluated the impact of various WEDM process parameters on the surface roughness and the metallurgical properties of the material. An ANFIS model is developed for the white layer thickness and the surface quality achieved. Vinod Kumar et al. [7] attempted reinforcement using the conventional and the cryogenic cooled WEDM process to analyze the WEDM performance of Aluminum-based MMC with SiC (10% by weight). Chalisgaonkar

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Research Article

Analysis of Machining Parameters in WEDM of Al/SiCp20 MMC Using Taguchi-Based Grey-Fuzzy Approach

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Aluminium silicate metal matrix composite (AlSiC MMC) is satisfying the requirement of material with good mechanical, thermal properties, and good wear resistance. But the difficulties during the machining are the main hurdles to its replacement for other materials. Wire electric discharge machining (WEDM) is a very effective process used for this type of difficult-to-cut material. So an effort has been taken to find out the most favourable level of input parameters for WEDM of AlSiC (20%) composite using a Taguchi-based hybrid grey-fuzzy grade (GFG) approach. The plan for experimentation is designed using Taguchi's L₉ (2³) array. The various process parameters considered for the investigation are pulse on time (T_{ON}), pulse off time (T_{OFF}), wire feed rate (WFR), and peak current (IP). Surface integrity such as surface roughness measured during the different types of cutting (along the straight, inclined, and curvature directions) is considered in the present work. Grey relational analysis (GRA) pooled with the fuzzy logic is effectively used to find out the grey-fuzzy reasoning grade (GFRG). The Taguchi approach is coupled with the GFRG to obtain the optimum set of process parameters. From the experimental findings, it has been observed that the most economical process parameters for WEDM of AlSiCp20 were the pulse on time is 108 microsec, pulse off time is 56 microsec, wire feed rate (WFR) is 4 m/min, and peak current (IP) is 11 amp. From the analysis of variance (ANOVA), it is observed that the pulse on time is the foremost influencing parameters that contribute towards GFRG by 52.61%, followed by the wire feed rate (WFR) 38.32% and the current by 5.45%.

1. Introduction

There is a chain of significant changes in the industrial needs that are characterized by complexity and volatility. Today, an industry needs a material which has properties such as durability, high strength, low weight, and low density which encourage the worldwide researcher to focus on the field of material and their applications. This switched the researcher towards the development of metal matrix composite. In the recent couple of years, the aluminium base composite fits the industrial requirements and use for numerous engineering applications such as piston, cylinder components of the automobiles, and aerospace applications. Depending upon

the work piece geometry, any machining operation can have more than one type of metal cutting operation that it normally uses. The three most common and easy types of metal cutting operations are straight machining, angular machining, and curvature machining or cutting. A straight cut is a machining operation which is used in almost all the machining operations. This type would allow the tool to move in the straight direction as shown in Figure 1(a). In the angular machining, the tool moves in the inclined direction for getting the triangular or trapezoidal shape. This type would allow the tool to move in the inclined or angular direction as shown in Figure 1(b). The last and the most important type of machining is the machining along the



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Taguchi Technique for Dry Sliding Wear Behavior of PEEK Composite Materials*

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Abstract

In today's industrial scenario, use of polymer composite materials for tribological applications have been increasing. In this regard, a study on polymer composite materials was carried out. The tribological behavior of PEEK composites, including different types and amounts of filler materials was examined. Effects of operating parameters such as sliding velocity, pressure and time on tribological performance of PEEK composite materials were studied. Wear tests were performed on a pin-on-disc set up using plan of experiments based on Taguchi's technique. Analysis of variance has been carried out to establish the relative significance of the individual factors on wear performance. An empirical relation between wear and operating parameters were established for all composite materials using linear regression analysis. The sliding velocity, pressure and test duration plays an important role on tribological performance of PEEK composite materials by influencing the temperature of contact area. It was observed that PEEK reinforced with CF, PTFE and graphite could effectively improve the tribological performance.

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Keywords: PEEK; Fillers; Taguchi Technique; Wear

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ICMPC 2017

Effect of Volute Tongue Clearance Variation on Performance of Centrifugal Blower by Numerical and Experimental Analysis

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Abstract

This paper focus on the effect of volute tongue clearance variation on the performance of backward-curved blades centrifugal blower. The four types of casings of the centrifugal blower with different volute tongue clearances of 6%, 8%, 10% and 12.5% of impeller diameter were used for numerical and experimental analysis. Computational fluid dynamics model was developed for the numerical analysis based on experimental setup. Reynolds-averaged Navier-Stokes equations with the standard k- ϵ turbulence model were discretized with finite volume approximations. The Numerical results were validated with the experimental results by using IS: 4894-1987. The performance parameters such as total pressure, efficiency and flow rate of the blower were calculated. The results show that the volute tongue clearance has a significant effect on the performance of centrifugal blower and these parameters increases with decrease in volute tongue clearances.

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Keywords: Centrifugal blower; CFD; Blower performance; Volute tongue clearance.

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Static and Fatigue Analysis of Lathe spindle for Maximum Cutting Force

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Abstract

In this paper, the effect of approach angle, feed, depth of cut and nose radius on cutting force components were investigated. The experiments were conducted on PSG 124 lathe machine using carbide coated cutting tools on material hardened EN9. The orthogonal array of L-16 was used for optimization of tests. Cutting forces generated during lathe turning operation were measured using three axis lathe tool dynamometer. Statistical regression analysis method was applied to investigate the maximum cutting force generated and which was found at an approach angle = 45°, feed = 0.3 mm, depth of cut = 1 mm and noseradius = 0.8 mm. Static and fatigue analysis has been carried out numerically by considering different forces acting on lathe spindle. Results of this analysis show, the present design of spindle is safe.

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Keywords: Taguchi method; Lathe tool dynamometer; Cutting force; Spindle design; Static and fatigue analysis; Tool geometry

1. Introduction

Machine tool spindle is the most important mechanical component in removing metal during machining operations. The structural dynamics of the spindle are evaluated at the tool tip since it directly affects the material removing rate [1]. The spindle is a rotating axis of the machine, which frequently used has a shaft at its heart. The shaft itself is called spindle. Machine tool spindles lead to unstable chatter vibrations, cutting forces and uneven tensions in the belt and pulleys [4]. This paper presents static and fatigue analysis by considering cutting forces and tensions in the belt and pulleys.

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STUDY OF PERFORMANCE PARAMETERS OF INCLINED HEAT PIPE FITTED WINDOW A/C SYSTEM

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Abstract: This paper principally covers experimental investigation of the impact of fitting a heat pipe in associate air window cooling system. a traditional cooling system consumes 30-35% of energy in reheating the overcooled air. A heat pipe is can be used to reheat the overcooled air gaining heat from the hot air going away from the condenser. this investigation studies the impact of fitting an inclined heat pipe in a very 1.5 Ton window air conditioning. the heat pipe is fabricated using copper pipe as the container, R-11 as the fluid and cotton as wick material. it's been discovered that use of heat pipe in air conditioning has substantial impact if used at correct location.

IndexTerms - Heat pipe, Window AC, Heat addition & removal, Performance Analysis.

Nomenclature

DBT - Dry Bulb Temperature

WBT - Wet Bulb Temperature

RH - Relative Humidity

KWH - Kilo-Watt Hour

Tr - Room Temperature

Te - Evaporator Temperature

Tc - Condenser temperature

Ta - Ambient Temperature

Wc - Compressor work.

Qa - Heat Absorbed.

Qr - Heat Rejected.

Qe - Heat absorbed in Evaporator.

Qc - Heat rejected in Condenser.

COP -Coefficient of Performance

1.1 INTRODUCTION-

The idea of heat pipes was given 1st by Gaugler (1994) General Motor Company in 1942. the primary heat pipe was designed and made by Grover (1966) in National research laboratory, Los Alamos, within the America in 1964. Since then, heat pipes are being employed in several applications such as: heat exchangers (air pre-heaters or systems that use economizers for waste heat recovery), cooling of electronic parts, solar power conversion systems, space vehicle thermal management, cooling of turbine rotor blades, etc.

Nowadays, surroundings pollution and limitations in energy resources have appeared as a significant world crisis. Therefore, energy conservation and energy potency are necessary for all told energy consuming devices as well as the air conditioning systems. As an economical heat exchanger, heat pipe heat exchangers are taking part in a substantial role in numerous fields together with air conditioning systems. Heat pipes are easy heat transfer devices with high, effective thermal conduction and therefore the capability to move an outsized quantity of heat over appreciable distances^{1,2}.

1.2 LOCATION OF HEAT PIPE

The location of heat pipe in the system is such that maximum heat can be extracted and supplied without any heat loss. One end of heat pipe (evaporator) is placed behind the condenser; at bottom left corner and the other end i.e. condenser end is placed in the cold air stream supplied to the room. The inclination angle of heat pipe with the horizontal is 45°.



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MATHEMATICAL MODEL FOR EVALUATION OF BACKPRESSURE EFFECT OF DPF ON PERFORMANCE PARAMETERS OF VCR 4S CI ENGINE

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Abstract: Since last 3 to 4 decades aftertreatment techniques are being increasingly utilized and research work is well under progress. Effective after treatment system, specifically for C.I. engines, requires critical analysis of the overall effect of backpressure on each particular C.I. engine performance. More efforts are required for the analysis of the after-treatment System, by further study of the theory of operation of each device related to C.I. engines. Search on Diesel Particulate Filters as a modern technology is very active because particulate matter is designated as a major cancer material.

Regeneration phenomenon in after treatment devices is a subject of special interest for design and development of Particulate Matter emissions control activities. The Backpressure acting on engine is most important factor which basically deteriorates the engine and emission control performance. In the present work, Dimensional analysis technique is used for determining the relationship between operating variables of Internal Combustion engines, then validation of the effect of back pressure generated on a C.I. engine, with and without the use of a specially designed Diesel Particulate Filter is done.

IndexTerms - VCR 4S CI Engine, DPF, Pressure drop, back pressure, Exhaust Emissions

I-INTRODUCTION

Particulate emissions from C.I. engines are an immediate health concern furthermore as a significant supply of overall environmental degradation. Development of a much feasible particulate emission management technology is thought-about as one of the foremost difficult tasks associated with the after-exhaust treatment technologies. The exaggerated use of C.I. engine for all classes of applications is that the major trend discovered worldwide since starting nearly in each field. Whereas the energy benefits of the C.I. engines are unchallenged, lower price of diesel oil is additionally answerable for its increasing popularity, significantly with reference to the less developed countries. Although, inherently cleaner than S.I. engines from the point of view of monoxide (CO) and hydrocarbons (HCs), C.I. engines emits a lot of aldehydes, sulfur oxides (because of the upper sulfur content in diesel fuel) and N oxides. Offensive smoke and odor emissions also are a problem of nice concern, most importantly; but uncontrolled diesel engines emit vital amounts of particulate. Despite the technical and industrial advantages of C.I. engines over the traditional S.I. engine power-plants, considerations became to grow as early as in 1980's over the environmental consequences of enhanced dieselization¹.

The exhaust system route exhaust gas from the engine and exhausts it into the atmosphere, whereas providing noise attenuation and after treatment of the exhaust gas to cut back emissions. one amongst the foremost necessary sources of car noise, the noise related to exhausting combustion gases from the engine, is controlled using mufflers. Exhaust gas properties that are vital for the design of exhaust system its physical properties, exhaust gas temperature, that depends on the vehicle duty and/or test cycle, and therefore the exhaust gas rate of flow. exhaust system materials are exposed to a range of harsh conditions, and should be resistant to such degradation mechanisms as hot temperature oxidization, condensation and salt corrosion, elevated temperature mechanical failure, stress corrosion cracking, and intergranular corrosion.

Exhaust emission from vehicles are often controlled in 3 alternative ways. One is to push additional oxygen for complete combustion, in order that there's less byproduct. The second is to supply excessive hydrocarbons into the engine for combustion, and also the third one is to arrange an extra space for oxidization or combustion to occur. Thus, the aftertreatment techniques appear to be more possible as compared to different diverse techniques for reducing exhaust emissions rather than going for engine and fuel modifications².

II-AFTERTREATMENT TECHNOLOGIES

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Engine after treatment requirement changes in response to dynamic Pollution management norms or legislation, that sometimes needs new technologies to be introduced. New technologies place specific challenges on after treatment systems. A quick summary relating to the most trends in after treatment system development and issues associated are discussed here. A demand for reduced back pressure altogether forms of C.I. engines in old, present and future engines using diesel or any alternate renewable fuel, since back pressure rise causes increase in fuel consumption. A requirement for economical exhaust energy recovery system and new improved noble & non-noble metal based mostly economical catalyst technologies, to get most attainable conversion efficiency for pollution management with sturdiness problems.

The most outstanding diesel particulate matter emission management technique uses Diesel Particulate Filter system. Collected particulates are removed from the filter, endlessly or sporadically, through thermal regeneration. The device captures ash, however the buildup of ash within the device is spare to cause an increase in back pressure. The failure of

ENHANCEMENT OF VCR 4S DIESEL ENGINE PERFORMANCE AND EMISSION CONTROL PARAMETERS BY IMPROVING DESIGN OF DPF

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Abstract: In case of after treatment techniques, particularly Diesel Particulate Filter, backpressure drawback could be a subject of specific interest for design and development of particulate matter emission management activities.

In the present work, critical study of after treatment system design aspects and alternatives available, repair and maintenance aspects for exhaust system are also studied so that particularly in C.I. engines exhaust conditions economic and quick regeneration or cleaning should be possible on regular basis, to avoid any type of exhaust flow problem.

During the experimentation, it is found that, with after treatment devices it is economically possible to reduce exhaust emissions from old engines also, rather than going for engine and fuel modifications. Economical maximum conversion efficiency of the pollutants with waste energy recovery without adversely affecting the engine performance and also with durability issues is an ideal requirement from an exhaust after treatment system.

Index Terms - Diesel Particulate Filter, Engine Performance, Backpressure, Exhaust Emissions.

1. INTRODUCTION

1. INTRODUCTION

Compression Ignition engines or Diesel engine is the most energy efficient power plant among all type of internal combustion engines known today. This high efficiency interprets to sensible fuel economy and low greenhouse emission emissions. Other diesel features that have not been matched by competing energy conversion machines include durability, reliability, and fuel safety. The downsides of diesels embrace noise, low specific power output, NOx and PM emissions, and high cost.

Emissions formed throughout burning of the heterogeneous diesel air/fuel mixture depend upon the conditions throughout combustion, during the expansion stroke, and especially prior to the exhaust valve opening. NOx emissions are formed through variety of mechanisms throughout each the premixed and diffusion burning. PM is generated in diesels primarily throughout the diffusion flame. The visible smoke emission is classified into black smoke, also known as hot or solid smoke, and white smoke also referred to as liquid smoke or fog.

Changes in ICE design contributed to some 10-fold decrease in emissions over time from the late 1980's to early 2000's. The most vital of those engine technologies are advanced fuel injection systems, air intake improvements, combustion chamber modifications, and electronic engine control.

Additionally, exhaust gas re-circulation (EGR) was introduced on both light- and heavy-duty diesel engines to control NOx emissions. Low emission engine design combined with enhanced exhaust gas after treatment can still play vital role in future diesel engines.

2. AFTER TREATMENT STRATEGIES

To develop application specific view, it is very important to consider overall effects of each component added to the system, so that to improve the overall system performance. In the case of after treatment devices used in exhaust system of engine, considering automobile power plant as a complete system, it is a complex system made up of several other equally complex sub-systems, each is distinct from the others but they all share some common features and goals that allow them to work together.

After treatment devices installation should be in such position that the operating parameters of the devices must be favorable that is by considering following points: 1) To obtain the different oxidation and reduction reaction, the light-off temperature required and ability to sustain the maximum temperature by the catalysts. 2) To reduce the backpressure and keep it within limit., 3) To provide ease for accommodation and modification in the exhaust system such as EGR system requires backpressure for optimum performance., 4) To obtain maximum conversion efficiencies without affecting the overall engine performance throughout the operating range, .5) To obtain maximum space utilization without interfering the other system operations.

Temperature management of exhaust gas is of increasing interest because of the need to maintain efficiency in after-treatment devices. More effective temperature management places requirements on heat exchange systems, and offers the

EXPERIMENTAL AND FINITE ELEMENT ANALYSIS ON THE STEEL FIBER REINFORCED CONCRETE (SFRC) BEAM UNDER PURE TORSION

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Abstract : Concrete with steel fibers, as an additional ingredient in it, is known as steel fiber reinforced concrete (SFRC). The fibers added in the concrete mix improve substantially its resistance to all the types' of individual and combined loadings.

Paper analyzes the influence of steel fibers on the torsional strength of concrete beams under pure torsion. Ultimate load tests were carried out on 6 rectangular beams. Crimped steel fibers with a length to diameter ratio 50 and volume fraction of 0.6 were used. The observed ultimate torsional strength results have been verified by existing models. The torsion twist values are analyzed with the numerical approach method by using ANSYS, a finite element package. The numerical results are in good agreement with the experimental results.

IndexTerms - Steel Fiber Reinforced Concrete, Torsional strength, twist, Finite Element Analysis.

I. INTRODUCTION

Concrete is acknowledged as one of the most important and useful materials in engineering construction field because of its high compressive strength. Using concrete, it is now possible to design structures of any desired shape and size to meet the requirements imposed by wide range of use, applied loads and aesthetics. It is now possible to create forms of great structural efficiency and architectural beauty. But, though concrete is very strong in compression, it is equally weak in tension. This inherent weakness of concrete leads to formation of cracks and their propagation under excessive loads. In concrete, the cracks appear as soon as principal stresses exceed the tensile strength of concrete and immediately after the initiation of such cracks, their propagation takes place and the collapse occurs. This deficiency is overcome by introducing reinforced concrete and pre-stressed concrete systems, in which the strength of concrete is augmented by introducing tensile reinforcement. These systems are not improving the inherent weakness as such of the concrete matrix, but are equipping the concrete cross section with the separate element of tensile steel reinforcement to bear almost all the tensile load on the cross section. To improve the material strength of matrices in several utilities, the fibers were used from ages together; for example, straw fibers, horsehairs, jute fibers, etc. were observed to be used by potters since ancient ages. It is also observed to be used since ages in tiles and bricks for strengthening them over their brittleness. In due course of time, it was established that the weakness of concrete to resist tension can also be overcome to certain extent by mixing the fibers in concrete matrix. Concrete with steel fibers, as an additional ingredient in it, is known as steel fiber reinforced concrete (SFRC). The fibers added in the concrete mix improve substantially its resistance to all the types' of individual and combined loadings. Out of the several types of fibers, the experimentations have proved the superiority of steel fibers and are being used extensively in engineering applications. It is being used as an ideal material for overlays, over slabbing for road pavements, airfields, bridge decks, industrial floorings, tunnel linings, coastal constructions, etc. Of all the fibers, the steel fibers are the best suited for structural applications also. It is practically proved that the steel fibers can provide effective reinforcement against shear failure, flexural failure and combined failure. Many investigators [1-6] have well established that the inclusion of high strength, high elasticity modulus steel fibers of short length and small diameter enhance the tensile strength, ductility and other properties of concrete significantly. Fibers also act as crack arrestors. Uniformly spaced steel fibers effectively arrest the cracks, but due to practical difficulties short and randomly oriented steel fibers are preferred.

II. LITERATURE REVIEW

The effect of steel fiber reinforcement was studied by Narayanan and Green [3], Narayanan and Kareem Palanjian [4-5]. Models proposed by them are not expressing the effects of fiber properties and concrete properties separately but are giving the combined expression for them. Narayanan and Kareem Palanjian [6] also proposed a space truss model to incorporate the effect of steel fibers in the ultimate torsional strength of SFRC beams separately. In this model, the ultimate torsional strength is the combination of contributions by plain concrete matrix and by steel fibers, distinctly.

Thus, the overall ultimate torsional strength of SFRC rectangular beams was proposed by Narayanan and Kareem Palanjian, in the separate terms for concrete matrix and steel fibers as

$$T_u = T_p + T_f = 0.13x^2y\sqrt{f_{cu}} + \frac{0.22\lambda x_0 y_0 xy F \sqrt{f_{cu}}}{(x_0 + y_0)}$$

T_u = ultimate torsional strength by the model of Narayanan and Kareem Palanjian.

T_p = Torsional strength of plain concrete

T_f = Contribution of steel fibers in ultimate torsional strength


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Effect of Variation in Impeller Diameters on Performance of Centrifugal Blower

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ABSTRACT: Centrifugal blower is used to deliver the air or gas with an appreciable rise in pressure against the flow resistance. It plays an important role in various industries for air-conditioning systems, furnaces and dust or fume extraction systems. The backward inclined blade centrifugal blower was considered for study and analysis. The inlet and outlet diameters are varied simultaneously and their effect on the performance of centrifugal blower was analysed numerically and experimentally. The results showed the variation in impeller diameters have large effects on the performance of centrifugal blower. Performance parameters flow rate, total pressure and shaft power increases when impeller diameters are increased and decreases when they are decreased but efficiency increases when impeller diameters are decreased.

INDEX TERMS: Centrifugal blower, Inlet diameter, Outlet diameter.

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I. INTRODUCTION

Centrifugal blower uses for the continuous flow of air or gas that industrial blower generate, including combustion, ventilation, aeration, particulate transport, exhaust, cooling, air-cleaning, and drying as per applications. Centrifugal blower have several advantages over other blower types because of their wide operating ranges and high speed capabilities.

The radial difference between enlarged impeller and original impeller should be within 100 mm, if the outlet diameter of impeller is increased by 5 % and 10 % respectively all the performance parameters increased while efficiency decreases. [1] Pressure developed inside the impeller is not uniform and increases from suction to outlet duct when impeller diameters are varied. Large impeller gives more pressure fluctuation at a monitoring point near the tongue.[2]

The irregular blade spacing of impeller will have same characteristics implies that alteration in blade spacing do not alter the operating characteristics. Decreasing the impeller outlet diameter will gives better efficiency, higher pressure and homogeneous flow field as compared to the other geometrical change in impeller. Pressure fluctuations are higher for large impeller diameters. [3] Patil et al. studied the effect of volute tongue clearance changes on the performance parameter of the centrifugal blower by numerical and experimental analysis. For numerical and experimental investigation four types of casing with variation of 6%, 8%, 10% and 12.5%

in volute tongue clearance were used. The back flow at the region near the volute tongue is reduced drastically which cause the total pressure and efficiency to increase. The results clarify that performance parameters increase with decrease clearance. [4]

As the diffusion of flow is highly complex in centrifugal blower operation, it is necessary to design and develop the geometry of impeller and casing to reduce the flow losses significantly. The performance of centrifugal blower is mainly on design parameters of impeller, by changing some geometrical characteristics of the centrifugal impeller blower has more efficiency.[5] Jayaprakash.C.N et al. made the study on optimization of the alternative blower of travelling cleaner of radial type using CFD. The experiments were carried out for different fan outlet diameters which were 170mm, 180 mm, 190 mm and 200 mm while the different fan blade angles were 60°, 70°, 80° and 90° and finally the different number of blades being 6, 8, 10 and 12. Taguchi orthogonal array method has been implemented and optimum design was found.[6]

Tahsin Engin et al. designed and fabricated three semi-open centrifugal fan impellers using ceramic materials to provide high resistance to temperature. Results shows that use of simple impeller geometries of ceramic materials were less sensitive to the varying tip clearance. Variables affecting performance due to tip clearance found to be impeller specific speed, blade exit angle. [7] O. P.

Contact stress analysis of steel and composite spur gear pairs

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Abstract

Gears are one of the most critical components in a mechanical power transmission system and in most rotating machinery. Gear teeth usually fail due to increase in load above certain limit. Therefore, it is required to use different materials for gear manufacturing. Metal matrix composites possess improved properties including high strength, high stiffness, and reduction in weight, compared with unreinforced alloy. The objective of this work is concerned with replacing metallic gear with gear of composite material of aluminium silicon carbide and fly ash so as to improve performance of machines and to have longer working life. Aluminium alloy, SiC and fly ash are used as matrix and reinforcing material. Contact stress is the key parameter in mating gear in gear design. This work represents contact stress analysis of steel and composite gear pairs using hertz theory and finite element analysis (FEA) using ANSYS. In this work, aluminium silicon carbide and fly ash is used as a gear material. Also experimental stresses are calculated using strain gauge technique. When compared, the results of both theoretical method and FEA show a good degree of agreement with experimental results. It is observed that stresses are nearly reduced by 18% by the use of composite material. Also the weight of composite material is nearly 3 times less than steel material. So the composites can be used for making power transmitting elements such as gears, which are subjected to continuous loading.

Keywords

Contact stress, Hertz equation, Spur gear, Composite gear, ANSYS 16.0, Strain gauge.

1. Introduction

Aluminium alloy materials or simply metal matrix composites are combinations of materials. Composites are made up of combining two or more materials in such a way that the resulting materials have certain design properties or improved properties. Aluminium alloy composite materials are mostly used for a many number of applications such as engineering structures, electronic applications, sporting goods as they are less in weight with better properties [1].

Gears are the most common method of transmitting power in mechanical engineering. With the moving wheel of science and technology the use of gears has become preferably common in almost all the upcoming industries. The spur gear are simple in design, manufactured economically, requires less maintenance. Fly ash, borax powder or magnesium is added to improve the properties [2]. In present work the main objective is to replace metallic gear with gear of composite material of aluminium silicon carbide and fly ash so as to improve performance of machine and to have longer working life.

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The objectives of this paper are as follows:

1. To design and analyze the gear using computer-aided design (CAD) and computer-aided engineering (CAE) software.
2. To increase the contact strength of spur gear using composite material.
3. To determine the contact stress by using strain gauge setup.

2. Literature review

Pawar and Utpat [1] have developed a metal matrix composite of aluminium based silicon carbide. Authors has done FEA of gear using ANSYS 14.0 and concluded that composite gears offer improved properties over steel alloys and can be replaced with metallic gears [2]. Saravanan and Kumar[3] has developed metal matrix composites by varying rice husk ash percentage and concludes that with increase in percentage of rice husk ash in metal matrix composites will increase ultimate tensile strength, compressive strength and hardness of the composite. Devi et al. [4] conducted experiments for tensile strength by varying mass fraction of SiC with aluminium and found that aluminium silicon carbide composite material is having less weight and more

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Experimental and numerical analysis of a load distribution along the length of contact in involute spline shaft

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Abstract

In mechanical drive system for transmitting power the spline hub connections are widely used. Finite element method is used to find the load distribution along the length of spline, for analysis a frictional contact with 0.15 coefficient of friction and pure penalty method is used. For finding the load distribution three location is defined as entry, mid and exit. It is observed for partial spline contact over a length, two zones are created as contact and free zone. The analysis is performed for five partial contact length and torque respectively and it is observed that there is average 10.82% stress reduction at the entry point of spline and 64.60% stress reduction at the middle point of spline. There is no change is in the stress at the exit of a spline. The nature of the stresses in contact zone is uniformly decreasing toward the free zone and the stresses in free zone are also uniformly decreasing toward an exit of spline. The highly localized stress is identified in free zone probably at the end of percentage length of contact and this stresses uniformly decreasing toward the shoulder of spline shaft in the free zone. At the end of spline contact the stresses are high and this causes the failure of spline at this location.

Keywords

Involute spline shaft, Load distribution, Contact length, En19 alloy steel, Finite element analysis, Experimental stress analysis.

1. Introduction

The involute spline hub connection under pure torsion loading case aims to find the load distribution along the length of spline and localized stress area on teeth. Spline shaft for transmitting a torque is used. Properly align connection without sliding and angular misalignment is used. When the shaft is connected to a pure and study torque load, then the connection is under pure torsion loading condition. In pure torque transmitting case the spline teeth are under shear stress. In this paper the location for the stress along the spline length for partial contact length and the load distribution along the length of spline teeth is evaluated. Load distribution along the length of spline is measured by designing an experimental setup. The setup consists of spline connection mounted on the fixture. To apply a torque loading arm is used; strain gauges are installed on the teeth to measure the strain. The electronic system has facility to monitor the strains measured on the teeth.

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The study on the fix contact length for the spline hub connection is done in this paper. The study for the various contact length and load variation is done. The effect of change in contact length for the various torque cases is investigated. The experimental setup is designed with single channel strain indicator system which is helpful to determine the strain at the connection. For measuring a strain at the connection, the strain gauges with a compact size is used. The strain gauges mounted on the spline teeth along its length to predict the localized stress along the length. The spline shaft is designed with the En19 material characteristics and hub as well. Involute spline geometry is defined, as the involute spline geometry have a more load carrying capacity compared with the rectangular and trapezoidal spline geometry.

Experimental analysis is completed by using the strain gauge technique. The compact strain gauges are used along with the strain indicating device. The reading for strain value at entry, mid, exit portion of the spline length is taken and with the help of these strain stresses at that location is calculated from the

Effect of Flow Distortion in Inlet Duct on the Performance of Centrifugal Blower

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Abstract- In this paper, the effect of flow distortion in the inlet duct on the performance of centrifugal blower has been numerically and experimentally investigated. Numerical analysis was carried out on centrifugal blower with hub and tip distorter with 25 % blocked area in inlet duct. ANSYS Fluent 16.0 software was used for numerical analysis. Flow rate, total pressure, blower efficiency and discharge head were taken as performance parameters. Numerical analysis was also done for original centrifugal blower having straight circular inlet duct. According to IS: 4894-1987 experimentation was carried out on original centrifugal blower and modified centrifugal blower with tip and hub distorter. Performance parameters were evaluated from numerical and experimental results. Validation of numerical results with experimental results was done. The results indicated that flow distortion degrades the performance of centrifugal blower in terms of flow rate, blower efficiency and discharge head.

Keywords- Centrifugal Blower; Hub distorter; Numerical analysis; Performance parameters; Tip distorter. axisymmetric obstacles are mainly responsible for

1. INTRODUCTION

The centrifugal blowers are nothing but one of the types of turbo machines which are primarily used for accelerating air continuously to accommodate large volume of air with slight increase in static pressure. Blowers are extensively used in industrial and commercial applications such as shop ventilation, material handling, boiler applications and vehicle cooling systems.

Distortion in inlet duct refers to the non-uniform flow upstream of turbo-machines. Inlet flow distortion can be detrimentally affecting the performance of the fans, blowers and compressors in terms of static efficiency and pressure rise. Inlet flow distortions can also affect the stability limits of these turbo-machines in terms of aerodynamic and aero-elastic properties. [1] The problem of determining how much a turbo-machine is affected by poor inlet flow conditions is an old one. It arises in HVAC design and installation, layout of hydraulic pumping systems and in the design of inlet configurations for both ground-based and airborne gas turbine compressors. [2]

The flow non-uniformity is frequently generated at the entrance of impeller called as inlet distortion, which is divided mainly into two types of distortion. One is radial distortion and other is circumferential distortion. The radial distortion is further subdivided into tip distortion and hub distortion corresponding to the regions where obstacle is placed. Hub distortion is observed when axisymmetric obstacles are placed at a center portion of an inlet duct, such as a tachometer pick up and a hub cover. Axisymmetric boundary layers of an inlet duct or a return channel or an orifice plate are responsible for tip distortion. Non-

circumferential distortion. [3-4] In turbo-machineries such as compressors, due to limited space curved inlet duct are generally used to provide and guide air to casing. Such a curved inlet duct can generate flow distortion in compressor therefore deteriorate compressor stage performance. [5]

Inlet flow distortions occurred due to various inlet duct configurations including obstacles, struts and bending duct can be seriously affected performance of centrifugal compressors. Kim *et al.* have conducted experimentation on centrifugal compressor with straight circular duct and a 90° curved duct with nozzle shape to compare stage efficiency. [6] Patil *et al.* have done experimentation and numerical simulation to investigate the effect different volute tongue clearances such as 6 %, 8 %, 10 % and 12.5 % of impeller diameter on the performance of centrifugal blower. Numerical simulation was done using ANSYS Fluent software. They used mathematical model as standard k- ϵ turbulence model for solving 3D Reynolds Averaged Navier Stokes equations. [7] Girish *et al.* have done CFD simulation of centrifugal blower using ANSYS CFX. They have obtained velocity vector and pressure counter plot for different blower speeds to evaluate performance parameters. [8] Naseri *et al.* have obtained experimental results which determine adverse impact of inlet total pressure distortion on the performance of a micro gas turbine. Experimentation was carried out on the gas turbine which was exposed to inlet gas flow with 60°, 120° and 180° circumferential distortion patterns. The performance of the gas turbine has been evaluated and compared with straight inlet gas flow case. [9]

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Performance Evaluation of a Centrifugal Blower for Different Rotational Speeds of an Impeller by Numerical Analysis

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Abstract : A centrifugal blower, in case of space constraints the rotational speed of an impeller is a design parameter to fine tune the performance of it. This study has been undertaken to investigate how the rotational speed of an impeller affects the performance of centrifugal blower by numerical analysis. Solid modelling software SOLIDWORKS 2016 is used to create the solid model and numerical analysis is carried by using analysis software ANSYS 16.0. The performance is evaluated for speeds of 1500 rpm, 2000 rpm, 2500 rpm and 2800 rpm. From numerical analysis the different performance parameters flow rate, total pressure, shaft power and efficiency are obtained. The experimental analysis was performed by the previous researcher on the same configuration setup as considered for the numerical analysis in the present work. The numerical analysis results are validated with the experimental analysis results. It is observed that there is an increase in the value of the performance parameters as the speed is increased from 1500 rpm to 2800 rpm.

Index Terms - Centrifugal blower, Rotational speed, Numerical analysis, Performance parameters.

1. INTRODUCTION

The blowers are used to achieve higher pressures as compared to the fans. In the industrial vacuum systems their use includes producing the negative pressures. Depending upon how the air is flowing through the blower, the two primary types include axial and centrifugal type. In the axial type of blowers, the flow is parallel to axis of the blower. They are used for applications which have relatively lower pressures and higher flow rates. Sickle, airfoil, variable pitch and paddle are the blade shapes of these blowers. Centrifugal blowers produce high pressure with high efficiency and can also be used where the operating conditions are harsh. Pressure is created to move air against a blocking caused by dampers, ducts and other components. The pressure of the supplied air is increased owing to kinetic energy of the impeller blades. They are quiet, reliable, sturdy and able to operate in different range of conditions. They are used in various industries to carry the materials or gases and in ventilation systems of the buildings.

The major parts of the centrifugal blower include the housing or volute casing, drive shaft, outlet ducts, impeller blades, inlet ducts and a drive mechanism. The inlet and outlet ducts are attached to the casing of the centrifugal blower with the help of nut and bolt arrangement. The energy is transferred owing to the rotary motion of impeller. The impeller is followed by stationary casing in which energy transformation takes place. The casing decides the pressure rise and size in the system. In a centrifugal blower, the air enters in radial direction and goes out in tangential direction thus providing high discharge and static pressures. Owing to the rotation of the impeller inside the casing, low pressures are created at the inlet thus allowing the air to flow inside. Then the air travels through the blade passages and moves out. The air moves out due to the deflection of blades and centrifugal force and thus proceeds to the volute casing. The volute casing maintains the discharge of the flow and guides out the air through the outlet duct. Depending upon the application, the impeller blade can be radial, forward or backward type. In this study a backward type impeller is used.

Experimental analysis is time consuming and expensive due to constructing and testing physical prototypes in a hit or miss process thus proving to be non-profitable to the manufacturers. Thus without the need to manufacture the prototypes, the performance can be predicted by various computational methods. These methods not only save time and expenditure but also offer reliable solutions. For this reason Computational Fluid Dynamics (CFD) analysis with suitable turbulence modelling currently has more benefits than the experimental works. A complete performance evaluation of a specific design can be obtained by an engineer by the numerical simulation. The fluid behaviour in the machine can also be predicted correctly with help of numerical simulation.

When the speed is varied, the performance of the blower can be approximately predicted by the fan laws. It is due to the fact that in fan laws the speed of the impeller is in some relation with the performance parameters flow rate, total pressure and shaft power. The fan laws equations are as follows

Fan law 1 states that the flow rate is directly proportional to the rotational speed of the impeller as shown in Equation 1,

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CFD analysis of diffuser augmented wind turbine

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ABSTRACT

Flanged Diffuser is a collecting-accelerating device that shrouds a turbine. For given rotary engine diameter, the power augmentation may be achieved by a brimmed diffuser, popularly known as wind lens. The current numerical investigation deals with the result of the low region created by wind lens to analyze the sturdy vortices shaped by brim connected to the shrouded diffuser at the exit. Additionally, during this analysis, a comparative numerical prediction of mass flow rates the turbine has been allotted with numerous sorts of wind lens that successively helps to optimize the torque augmentation. It's been well-tried that there's an important increase within the vortex strength & wake formation once the brimfull effect is added to a diffuser.

Keywords— DAWT, Windlens, Brim, Diffuser

1. INTRODUCTION

For the application of an efficient energy resource in future, the limitation of fossil fuels is obvious and also the security of different energy sources is extremely necessary subject. Moreover, due to environmental problems, i.e., heating, etc., application of renewable and clean energy are powerfully expected. Amongst all others, wind energy technology has developed quickly and are about to play a necessary role during anew energy field. However, making comparison with the overall demand for energy, the dimensions of wind power usage continues to be tiny. As for some reasons, various causes area unit occurred. For instance, the restricted local space for wind power plants, the complicated terrains compared to it in European or North American countries & the turbulent nature of the native wind noted. Therefore, the invention of a brand new wind generation system that produces additional power output even in these areas wherever lower wind speeds and sophisticated wind patterns are created. Power generation by exploitation wind is proportional to the cube of wind speed. That's why for increasing the output we must always have to increase the speed of the approaching wind to a wind turbine. If we tend to utilize the fluid dynamic nature around a structure or topography we tend to increase the wind speed particularly if we tend to concentrate the wind energy domestically additionally the facility output of a wind turbine be accumulated. This study is concerning the improvement of a wind generation system with additional output, aims at determining a way to collect the wind energy effectively and which kind of turbine will generate energy with efficiency from the wind. There are some hopes for utilizing the wind generation by more economical means. During this gift study, the idea of accelerating the wind was named the "windless" technology. The wind turbine with a brimmed or flanged diffuser shroud -so-called "windless turbine"- is developed mutually of high-performance wind turbines. The wind-lens rotary engine generates electric power even in low-speed wind since the brimmed-diffuser shroud will increase the speed of wind at the rotor. Wind lens windmill could be a compact formed high-efficient urban tiny windmill that may be put in any place. It's been greatly increasing the output by mounting the special ducts on blades than conventional wind generation generator. to beat varied problems within the typical wind generation by reducing the noise, will currently tiny wind generation generator which may be easily put in up to now areas. A special duct is attaching around the rotor, and it generates a robust vortex within the rear of the wind turbine. Due to the vortex, lowers pressure region is produced at the rear of the windmill, it accelerated the speed of the wind that flows into the duct (see figure 1).As power generated by the turbine is proportional to the cube of the wind speed, it's potential to extend output some3-fold once compared to the absence of the duct. What is more, the rotation area of the blade (sound source) is that and also the current Fluidic structure itself is compact and has achieved wonderful silence because it suppresses the blade tip vortex that becomes the noise source. Additionally, since the collector-style lens is encircled by a blade, it additionally obtained a visible sense of security.

Experimental identification of non-hysterisis algebraic force model of automotive hydraulic damper

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Abstract: A systematic methodology through grey box modelling is proposed for the nonlinear force characterisation of telescopic hydraulic dampers. The structure of force model is obtained through the theoretical analysis of damper operation based on principles of mechanics. A theory is developed to estimate the model parameters from experimental testing by using both sinusoidal and cyclic ramp excitation. The Coulomb friction and gas force components are obtained from quasi-static sinusoidal motion of damper and the components of velocity dependent damping force are obtained by using cyclic ramp excitation. The commercially available vehicle damper is used to demonstrate the proposed methodology for characterisation of damper force. The model parameters are obtained and the model is validated with experimental results to show its effectiveness. Being algebraic in nature and less parameters, it will be easy to implement in vehicle simulation.

Keywords: automotive hydraulic damper; shock absorber; damping force; damper force; coulomb friction; gas force; hysteresis; sinusoidal excitation; cyclic ramp excitation.

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Modelling and analysis of assembly clearance by size and form tolerances in selective assembly using clustering algorithm

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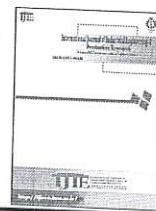
Abstract: In this paper, a new method in selective assembly to minimise the assembly variation due to the size and form tolerances of the mating components is proposed. The radial assembly of hole and shaft is analysed with the form tolerances of circularity and straightness respectively. The mating components are segregated into selective groups with respect to their size as well as form tolerance deviations. The assembly clearance between any pair of mating components is calculated by the Euclidean distance measure. A *K*-mean clustering algorithm has been used to club the mating components and clusters the assemblies according to the required assembly fit specification based on the proximity of mating data points. A case example with hole and shaft assembly has been successfully used to explain the application of selective assembly based on size and form tolerance deviations.

Keywords: selective assembly; form tolerance; clustering algorithm; radial assembly.

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Optimization of Performance Parameters for OHNS Die Steel using Dimensional Analysis Integrated with Desirability Function

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KEYWORDS

Desirability function;
Dimensional analysis;
Multi-response;
Optimization;
OHNS Die Steel.

ABSTRACT

Wire electrical discharge machining (WEDM) of oil hardening die steel materials is a complicated machining process. Hence, to determine the best set of process parameters is an important step in the wire EDM process. In the present work, multi-response optimization of machining parameters was done by using a technique called desirability function analysis coupled with the dimensional analysis (DA) approach. The experimentations were carried out as per Taguchi's L_{27} orthogonal array for (Oil Hardening Non-Shrinking Die Steel) the OHNS die steel material. Parameters of the WEDM process, such as pulse on time, pulse off time, input current, wire feed rate, and the servo voltage, were optimized by a multi-response optimization technique to optimize the responses such as material removal rate and surface roughness. Based on desirability analysis, the set of most favorable levels of parameters has been identified. The significant contribution of parameters is determined by dimensional analysis. From the experimental results, it has been observed that the DA approach is in good agreement with the measured responses. The correlation up to 99% has been achieved between the developed model and the measured responses by using dimensional analysis approach. Thus, the presented methodology can be used in the future for the critical analysis of any engineering process.

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1. Introduction

Wire-electrical discharge machining (WEDM) is a non-traditional machining process that is used to cut the materials with an electrode that follows a definite pathway to shape complex and complicated products. M.R.Phate & V.H.Tatwawadi [1,2] used an approach of dimensional analysis to formulate the model for the dry machining of ferrous and nonferrous

materials. Ilhan Asilturk and Mehmet Cunkas [3] used multiple regressions and the artificial neural network for the turning process. They analyzed the impact of cutting speed, feed, and depth of cut on surface roughness. Gaitinde et al. [4] used an artificial neural network technique to analyze the performance of conventional and wiper ceramic inserts in hard turning. An acceptable and efficient result was obtained by these techniques. I.M.Jamadar and D.P.Vakharia [5] used a DA approach and ANN based on back-propagation neural network (BPNN) to analyze the vibration responses due to artificially spalled

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