

SUSTAINABLE CHARACTERISTICS OF FLY ASH BASED GEOPOLYMER CONCRETE INCORPORATING ALCCOFINE, ZEOLITE AND RUBBER FIBERS

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Development of sustainable and energy efficient construction material has been the viewpoint of research efforts worldwide in recent years. Although the use of Portland cement is unavoidable, many efforts are being made to minimize the use of Portland cement in concrete to a greater extent in infrastructure applications. It is time to utilize new technology materials like geopolymers that offer waste utilization and emissions reduction with enormous ability. An alternate binding material to the OPC has been found out known as geopolymer concrete (GPC). In this study, GPC will be made of fly ash incorporating alccofine in various percentages of 5%, 10%, 15% and 20% as partial replacement to fly ash. Zeolite was partially added to fine aggregate at 10%, 20%, 30% and 40%. Rubber fibers were added at 2% by the weight of binder. Alkaline activator for geopolymerisation was prepared by mixing Sodium hydroxide solution at 10M with Sodium silicate solutions are used. Control mix is casted for M30 grade concrete. The samples are proposed to be cured by hot-curing for 24 hours thus mechanical and durability properties were examined. Addition of zeolite at 30% and alccofine at 15% is found to be an optimal content in geopolymer content and when the concentration of zeolite in geopolymer concrete is increased the slump value decreases. The rubber fiber contents kept constant at 2%, only lesser voids are generated due to improper bonding between rubber fiber particles, which does not contribute more in compressive strength. Geopolymer presents denser microstructure, lower total pore volume and optimized pore structure compared to OPC paste and therefore geopolymer concrete is much more durable in an aggressive environment.

Keywords: Geopolymer concrete, fly ash, alccofine, zeolite, rubber fibers.

1. Introduction

Cement industry accounts considerable share for CO₂ emission due to high environmental carbon footprint of cement which cause global warming and other worst effects. Therefore it is important to take necessary measures to reduce carbon footprints. It can be overcome through economic mix design and by using alternate binding materials for concrete such as bacterial concrete or geopolymer concrete [1,2]. It is time to benefit new technology materials like geopolymers that offer waste utilization such as industrial byproducts and emissions reduction. GPC have high strength, with good resistance to durability characteristics. The approaches of GPC are commonly formed by alkali activation of industrial alumino silicate waste materials such as Fly ash, GGBS, metakaolin, rice husk ash etc., and have a very small Greenhouse footprint when compared to conventional concretes. The exploitation of river sand endangers the stability of river banks and creates environmental problems. Hence the use of alternative materials for river sand, such as manufactured sand, industrial by products, and recycled aggregates. Among these, the use of manufactured sand is gaining high potential. The shape and texture of M-sand lead to improved strength due to better interlocking between the particles [2-4]. Two main constituents of geopolymer ingredients are source materials and alkaline liquids and such source materials involves the production of binders from alumina and silica rich industrial

byproducts such as fly ash, GGBS, rice husk ash, etc. and therefore, this can also be termed as sustainable geopolymer concrete [5]. Due to the chemical composition, natural zeolites are among the possible raw materials for the production of geopolymers. Zeolites are crystalline hydrated alumino-silicates, composed of silicon and aluminium tetrahedra (SiO₄ and AlO₄) and linked by one oxygen atom [6]. These source materials react with alkali-activating solutions such as sodium or potassium hydroxide with sodium silicate and form cross-linked three-dimensional alumino-silicate network consisting of Si-O-Al-O bonds [7-16]. Rubber fibers enhance impact resistance but reduces compressive strength [13]. The mechanism for the geopolymerisation process activation involves three major reactions (a) Dissolution of Si and Al atoms from the source material through the action of hydroxide ions (b) Orientation or condensation of precursor ions into monomers (c) Setting or polycondensation or polymerization of monomers into polymeric structures. Alccofine has higher fineness, so acts as a micro filler and is rich in alumina content which have enhanced the hydration, geopolymerisation process and early setting properties [17-24]. Alkaline solutions play a major role in geopolymerization at the early stage as it dissolves the active aluminosilicate species in the reaction [25-28]. Burning rubber creates toxic smell and emissions of lethal gases with restrictions of law in some of the countries [27]. Heat treatment is necessary to achieve desired strength adds to the

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Prosopis juliflora fibre reinforced green building plaster materials – An eco-friendly weed control technique by effective utilization



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ABSTRACT

The use of eco-friendly materials are now becoming the field of interest in construction industry to ensure sustainability and healthy living. Gypsum plasters are eco-friendly building materials but are brittle in nature and hence reinforcement of these plasters using fibres has been found to be beneficial at its post tensioning stage. In this present work the control of harmful ecological impact of Prosopis juliflora invasive species by their effective utilization in building plaster is proposed. To assess the performance of this environmental friendly building plaster using Prosopis juliflora fibres the physical properties such as setting time, temperature rise and density were measured. Furthermore the Prosopis juliflora fibres were subjected to various chemical treatments (NaOH, K₂MnO₄ and distilled water) and the effect of these treatments on the interaction of fibre with gypsum plaster was evaluated in terms of mechanical strength characterization. Based on the observed results the enhancement in flexural strength of the plaster was observed coupled with the transformation of brittle failure to ductile failure. The toughness of the composites were also much enhanced with the addition of the fibres.

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1. Introduction

The use of gypsum plasters has become widespread due to the negative impacts caused due to cement production (Alena et al., 2011). In order to reduce the usage of cement the alternatives for cement and concrete products in construction industry are now being actively searched for (Sakthieswaran et al., 2016). Gypsum plasters are good in compression with high compression strength but like inorganic cements they lack flexural strength (Aakanksha et al., 2015; Adnan, 2001). Hence the incorporation of fibres as reinforcement of gypsum plaster becomes mandatory for the efficient utilization of gypsum for structural works (Bijen and Vander Plas, 1992). The synthetic fibres are now being replaced by natural fibres due to the non-renewable nature and non bio-degradable nature of synthetic fibres (Pierre et al., 2010).

Several research works have been performed by using glass fibres and other synthetic fibres as reinforcement for gypsum plaster (Amina et al., 2014; Nelson and Mar Barbero-Barrera, 2017; Vidya Tilak et al., 2015; Martias et al., 2014; Osman et al., 2014; Lushnikova and Dvorkin, 2015; Linlin and Guozhong, 2014; Wail et al., 2016; Hlubocký Lukas et al., 2015). Attempts have also been done to improve the plaster behaviour by the addition of natural fibres. For the past few

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EFFECT OF FLY ASH AND METAKAOLIN ON THE STRENGTH AND STABILITY CHARACTERISTICS OF SELF COMPACTING CONCRETE

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This research examined the workability, mechanical properties and durability properties of self-compacting concrete (SCC) with fly ash and glass fibers. Glass fiber was added to the concrete at a rate of 0.25% by the weight of binder, fly ash and metakaolin was replaced at the rate of 5%, 10%, 15%, 20%, 25% and 30% respectively to the cement. The workability of fresh concrete samples was assessed using slump flow, slump flow T50 and J-ring. The overall strength of hardened concrete was investigated by using compressive, tensile strength and flexural strength tests for a fixed water/binder ratio of 0.35 with grade of M30 at 28, 56 and 180 days. The mechanical properties of SCC show an enhanced performance compared to the control mix and satisfy the fresh concrete properties such as filling ability and passing ability. SCC shows better resistance to the external environment. Thus, it shows a successful use of waste products in the SCC leads to the sustainable nature.

Keywords: Self-compacting concrete, fly ash, metakaolin, glass fibers

1. Introduction

The properties of self compacting concrete (SCC) render good materials for use in structures with complicated and narrow sections and reduce the labor for casting concrete. Fibers with very small diameters have a high surface area, which increases their distribution in the concrete matrix and negatively affects the workability of SCC they influence the properties of fresh and hardened SCC [1]. SCC can be placed under its own weight without any mechanical compaction and improve high workability, passing ability and high deformability [2-4]. With the increasing pressure on the construction industry to reduce and optimize energy and cement consumption, the use of supplementary cementitious materials (SCMs) is a possible solution to reduce the global CO₂ emissions due to cement production [5]. SCC has the advantages of workability improvement, reduction in water demand, less segregation, reduced heat of hydration, increased long term strength, significant reduction of permeability and chloride resistance, reduced expansion due to alkali-silica reaction and increased sulfate resistance [6]. Fibers have the property of substituting a single large crack with a dense network of micro-cracks, and subsequently bridging the micro-cracks within the cement matrix and would transfer the induced tensile stresses from the cement matrix to the fibers, rendering ductile post-cracking behavior [7]. Resistance to segregation during casting is another reason for using SCC. This property makes concrete homogeneous during transport and pouring [8].

Filling ability is described as the concrete's ability to completely fill the desired space under its own weight. Passing ability is the concrete's ability to flow freely in small spaces around steel, reinforcement bars without clogging up or segregating, and segregation resistance is its capability to remain in a consistent state during transportation as well as before and after placement [9-11]. The main purpose of using SCC is to reduce the period of construction, to assure compaction in confined zones of structure where it was difficult to vibrate and to avoid noise caused during vibration [12]. The use of SCC has become popular during recent years due to the noise reduction during the construction phase and avoiding vibration [13, 14]. It is necessary to consider benefits such as waste incorporation to concrete, gains in durability provided by the high volume of mineral additions utilized, and in particular, the use of Portland cement in smaller proportions than those currently used [15]. The use of mineral additives such as slag, fly ash and silica fumes has been the subject of numerous investigations in all areas of self-incorporating concrete [16]. SCC has been portrayed as the most dynamic improvement in strong advancement for a drawn-out period of time [17]. SCC can be put and alter at any place by its self-weight. SCC is a staggeringly fluid mix it has incredible detachment, high deformability and has the low yield weight [18-23]. The use of waste materials in concrete has a benefit from the environmental point of view as the CO₂ emissions are reduced [24]. This helps to find one of the most environmentally and technically appropriate solutions for the disposal and recycling of industrial waste.

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MUTUAL EFFECT OF COAL BOTTOM ASH AND RECYCLED FINES ON REACTIVE POWDER CONCRETE

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Reactive Powder Concrete (RPC) is one of the advancements in concrete well known for its dense, compact structure and its superior performance at elevated temperatures. The momentous fact behind the dense matrix of Reactive powder concrete is exclusion of coarse aggregates, inclusion of fine materials possessing pozzolanic properties, steel fibers and super-plasticizers at proper proportions. The main objective of this research is to investigate the performance of RPC produced by partial replacement of cement by alccofine and quartz sand by coal bottom ash (CBA) and Recycled Aggregate Fines (RAF). CBA and RAF used were crushed and grinded to attain the particle size to effectively fill the voids and to reduce the porosity. The experimental investigation to determine the mechanical properties such as compressive strength, split-tensile strength and flexural strength and durability characteristics such as water absorption, sorptivity and acid attack tests were performed. The results showed that the fineness and particle size range of the CBA and RAF increase the potential to develop ultra-high strength in Reactive Powder Concrete. The RPC composed of 10% of CBA and 10% of RAF as partial replacement of Quartz Sand performed well in all mechanical strength characteristics and also within permissible limits in durability terms. The replacement of 40% Quartz sand by equal proportions of CBA and RAF proved to be satisfactory compared with that of control RPC specimens.

Keywords: Reactive Powder Concrete, Coal Bottom Ash, Recycled Aggregate Fines, Hot water curing, Mechanical strength and Durability characteristics

1. Introduction

Reactive Powder Concrete is an advanced invention of Ultra High Strength Concrete (UHSC) in construction materials. The main factors contributed to the prosperity of the Reactive Powder Concrete are low water-binder ratio, exclusion of coarse aggregates, inclusion of pozzolanic and silica rich fine materials such as ordinary portland cement, silica fume, quartz sand and micro-steel fibers. Several researchers have applied the aforementioned principles and studied the various strength and micro-structural properties of Reactive Powder Concrete (RPC). The performance of RPC is better at elevated temperatures and hence applied for special structures exposed to heat and high temperatures. Furthermore researches on the feasibility of the alternative materials for the binder and also the fine aggregates in concrete in order to obtain a desirable and sustainable construction material is increasing day by day. However the acceptance of the materials for real applications in concrete structures relies on the satisfactory economy and efficiency of the materials.

Evolution of mineral admixtures for replacing cement becomes imperative to overcome the emerging global warming issues associated with CO₂ emission on excess consumption of cement in construction material [1]. Alccofine is one of the supplementary cementitious materials obtained as ultra fine form of slag as by-product from steel

industry [2]. The economy and efficiency of alccofine received the attention of researchers and its extensive properties in concretes like geopolymers concrete was investigated [3, 4]. Incorporation of alccofine enhanced the polymerization followed by the compactness of the structure in geopolymers concrete [4]. However the research works on alccofine are limited. On the other hand, waste generation and disposal possess the major challenge for researchers to find an effective formula to get rid of the vulnerability of environmental hazards. The main two indispensable reasons for the waste generation around the world are waste by-products from the manufacturing units and one-time usage of materials. Many ventures to manage the waste generation problems are made by the researchers mainly involving recycling and reapplying the waste by-products in construction material which is always necessitated. Coal bottom ash (CBA) is one of the industrial by-products obtained from thermal power plants. Studies on incorporation of CBA in concrete as the partial replacing material for cement [1] and sand [5] were made and proved to be optimum on 50% replacement of fine aggregate [6]. The porous structure of CBA increases the inter-particle friction which decreases the workability [7]. However the pores of CBA projects itself as a lightweight aggregate and are capable to store the amount of water required for internal curing and have the potential to release the absorbed water for

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Studies on Cu_2SnS_3 quantum dots for O-band wavelength detection

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In this communication, we report on Cu_2SnS_3 quantum dots synthesized by the solvothermal process using different solvents. The optical properties of the quantum dots are analyzed by UV-Vis-NIR and photoluminescence spectroscopy. The results suggest that Cu_2SnS_3 material has tunable energy bandgap and appropriate wavelength for fabrication of light emitting diodes and laser diodes as sources for fiber optic communication. They exhibit wide absorption in the near infrared range. Further morphological studies with the use of atomic force microscope confirm the surface topography and the existence of quantum dots. The observed characteristics prove the efficiency of Cu_2SnS_3 quantum dots for O-band wavelength detection used in fiber optic communication and solar cell applications.

Keywords: solar cells, optical communication, Cu_2SnS_3 , O-band wavelength


1. Introduction

Nonlinear optical semiconductor quantum dots (QDs) are the building blocks of next generation photonics technology, due to their unique applications in fiber optic communication, ultrafast photonics, optical limiting and switching [1–3]. Semiconductor QDs are a special nanomaterial with unique tunable properties due to 3D confinement of electrons and holes. The 3D quantum confinement produces blue shift in the optical resonance with respect to QDs sizes; this is an important phenomenon, enabling us to produce the devices from the same constituents, which make the QDs operate at the same wavelength [4]. QDs are dominant in the strong confinement regime, so the QD laser diodes (QD LD's) are able to have an ultralow lasing threshold. The important aspect of 3D confinement keeps electron-hole pair well controlled so that the optical properties of QDs are independent of temperature. The advantages of temperature independence lead to developing

high stability. Quantum dot devices, such as QD LD's and QD lasers, act as sources for fiber optic communication.

PbSe, PbS, $\text{PbS}_x\text{Se}_{1-x}$, CdS, CdSe, $\text{Cu}(\text{InGa})\text{Se}$ QDs are extensively investigated, popular QD materials. Researchers suggest that these are the best materials for optical applications and solar cells [5–7]. However, the toxicity level present in Pb and Cd is very high and moreover, the cost of indium and gallium is very high. This limits their usage for widespread applications. In this regard, we need some unconventional nanomaterials for making QD LD's. Thus, on a par with existing materials, some reports on copper tin sulfide QDs, such as Cu_3BiS_3 , $\text{Cu}_2\text{ZnSnS}_4$, $\text{Cu}_2\text{CoSn}_2\text{S}_4$, have already been reported by some researchers. Copper tin sulfide QDs is basically a p-type semiconductor for optoelectronic applications with the bandgap range of 0.93 eV to 1.77 eV. It has high absorption coefficient value of $1 \times 10^4 \text{ cm}^{-1}$ and its important advantages are nontoxicity, earth abundance; it is also cheaper than other materials [8]. The Cu–Sn–S based

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Optimal autonomous mobile robot motion planning for green logistics

V. Sathya and M. Chinnadural

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Abstract

In 2017, CO₂ emissions from logistics activities is 0.82 million tons across the world. Introduction of low exhaust emission vehicles, reduction in transportation distance, introduction of electrical vehicles, improvement in load factor, reduction in cost, fast delivery are goals of green logistics. To accomplish these goals, Autonomous mobile robots are good choice. This paper proposes a good method for improving the performance of a warehouse robot by a multi objective optimal motion planning. Wheeled mobile robot is considered. Two multi objective optimisation algorithms [elitist non-dominated sorting genetic algorithm (NSGA-II) and multi objective differential evolution (MODE)] are used. A cubic NURBS curve constructs the robot path. Four multi objective performance metrics and two methods are utilised to examine the performance of MODE and NSGA-II algorithms. The results from a numerical simulation proved that the suggested method is a good idea to improve the green warehouse operations and to do necessary automation.


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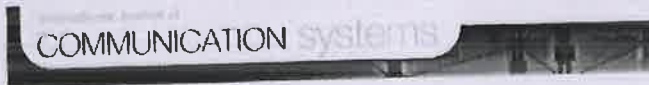
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Keywords

green logistics, green warehouse, autonomous mobile robot, multi objective optimal motion planning, elitist non-dominated sorting genetic algorithm, NSGA-II, multi objective differential evolution, fuzzy logic

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SPECIAL ISSUE ARTICLE

Multiple input and multiple output and energy-aware peering routing protocol for energy consumption in sensor networks

A. Sundar Raj M. Chinnadurai

First published: 02 December 2019

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Energy efficient routing algorithm in wireless body area networks for smart wearable patches

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Abstract

Presently most of the applications in Wireless Body Sensor Network (WBAN) demand effective communication processes, which is used to monitor the data in a remote manner according to the demand and timely manner for wearable systems. The data have been transmitted through the sensor networks among smart wearable devices which help to analyze the various security threats. The data transmission using sensor networks of smart wearable patches may consumes more energy which leads to minimize the entire network lifetime as well as to reduce the data transmission quality. Even though the network transmits the data with effective manner, the data has been aggregated from different sources via common aggregators in the smart wearable patches. At the time of the aggregation process, network lifetime needs to be managed for further data analyzes process. So, in this research the lifetime of the network has been managed by applying the opportunistic energy-efficient routing with load balancing (OE2-LB) algorithm which eliminates the data aggregation delay as well as avoid routing loops with effective manner for the smart wearable patches. Then the efficiency of the system has been validated in terms of network lifetime, delay, error metrics, Energy efficiency and throughput of the network.

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Soft Computing - A Fusion of Foundations, Methodologies and Applications 
A metaheuristic optimization model for spectral allocation in cognitive networks based on ant colony algorithm (M-ACO)

Authors: [B. Padmanaban](#), [S. Sathiyamoorthy](#) [Authors Info & Claims](#)

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 1  0

Feedback



Abstract

ABSTRACT

Cognitive radio networks have been gaining widespread attraction among researchers especially with the increasing demand for radio frequency spectrum whose availability is quite scarce. Cognitive radio networks provide an ideal solution to allocate spectrum to users on an intelligent basis through a series of spectrum sensing and decision making. A metaheuristic soft computing framework is proposed and implemented in this research work by using powerful optimization

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Enhanced data accuracy based PATH discovery using backing route selection algorithm in MANET

R. P. Premanand  & A. Rajaram*Peer-to-Peer Networking and Applications* 13, 2089–2098 (2020)131 Accesses | 26 Citations | [Metrics](#)

Abstract

Unstable Mobile nodes in the network does not maintain the accuracy of data transmission at the maximum level since the node's characteristics are updated, then nodes receive data's are intruded, its packet information is missed. Since that time, congestion is made for current routing path, so consider that path is a failure, also provide re transmission. It occupies more energy, and packet drop rate. In proposed Enhanced data Accuracy based Path Discovery (EAPD) technique is used to provide transmitting and receiving data has higher accuracy. It verifies the every node communication in routing path has maximum data accuracy, they are selected, otherwise, communication data have minimum data accuracy is rejected. The backing route selection algorithm is constructed to avoid


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Original Research | [Published: 24 May 2020](#)


RETRACTED ARTICLE: An enhanced design and random optimization for oversampling $\Delta\Sigma$ modulator


 V. Kalaiipoonguzhali  & S. Kannan

Journal of Ambient Intelligence and Humanized Computing

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 120 Accesses | 1 Citations | [Metrics](#)

 This article was retracted on 04 July 2022

 This article has been updated

Abstract

Delta Sigma Modulator (DSM- $\Delta\Sigma$) is a high-precision information converter that examines the Signal to Noise Ratio (SNR) in Radio Frequency Transmitter (RFT). This paper proposes an advancement model alongside with $\Delta\Sigma$ model for the designing process. The predictable result is low Over Sampling Rate (OSR) DSM, which would benefit fast, high-multifaceted nature computations, primarily required for wireless applications. The enhanced DSM is a non-ideal second-order feed-forward signal processing. The

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Harmonic Performance Analysis of a Wind Driven Micro Grid Inverter

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Harmonic performance analysis of a wind driven micro grid inverter

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ABSTRACT

The paper envisages measures to reduce the total harmonic distortion (THD) and harmonic spread factor (HSF) of the output voltage of a micro grid inverter. It involves the design of a variable structure controller (VSC) to derive the pulses for operating the switches in the inverter and there from enable the shaping of the output voltage to a nearly sinusoidal form. The methodology originates from the state space model of the system and brings in the control law to govern the operation of the PWM scheme. The framework includes a front end converter to exploit the maximum available power and engages a two stage process to provide a variable ac output to the utilities in the stand alone grid. The MATLAB based simulation results exhibit the performance improvement using the harmonic metrics to regulated output voltage over the range of operating loads and also the prototype registers to validate the simulated response.

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Micro grid inverter; variable structure controller; total harmonic distortion; harmonic spread factor; pulse width modulation and PMDC generator

1. Introduction

Harmonic performance analysis in the perspective of the wind energy systems assumes significance in view of its intermittent availability, the switching nature of the converter interfaces and the sinusoidal voltage requirements of the load.

The non-uniform heating on the surface of the earth due to the reflection of sun causes air circulation in the atmosphere. However, at night time there experiences a reversal of the process since the cooling of the air goes down on the earth surface and that blows off the shore.

The wind energy appears to be the fastest growing power generation sector among the available renewable energy sources. It enjoys the benefits in the sense that it does not pollute and can easily be harvested.

The extraction of power from the wind energy is a model that holds challenges with undisputed choice (Ramesh Babu and Arulmozhivarman 2013). The stand-alone systems is regarded as an effective tool to offer power continuously to loads, along with the batteries to supply the excess demand and allow the surplus to be stored in the batteries (Priya 2016; Bharanikumar and Nirmal Kumar 2012; Barote, Marinescu, and Cirstea 2013; Bhende et al. 2011).

Owing to the presence of the wind being intermittent in nature, it becomes necessary to explore alternatives for complying with the demand. The permanent magnet dc generator finds scope in being able to operate as a continuous source of wind in view of the fact that their lighter weight than the wound stator machines for a given power rating and higher efficiency in the absence of the field windings gather significance. Besides the permanent magnet generators accrue a host of advantages over conventional generators in that they do not need excitation and gearbox (Vigneshwaran and SureshKumar 2016).

In addition, the shape and frequency of the supply voltage may demand changes in the perspective of the load requirements. It creates a power electronics model and control schemes to predict the future challenges.

The existing conversion stages in power system has the rectifier with a dc link capacitor and an inverter, where it has two stage conversion and issues that require attention relate to the challenges in improving the quality of power transfer (Suresh and Arulmozhiyal 2016).

The permanent magnet synchronous generator (PMSG) has been seen to receive a lot of importance in wind energy applications due to their ability to operate at variable speeds and continuously adapt the rotational speed of the turbine to speed of wind. The performance has been studied using simulation and the merit of the speed of turbine system is variable and this is increasing with the energy captured (Jain, Shankar, and Vanitha 2018; Hussaine and Mishra 2015; SI-Subhi, Alsumiri, and Alalwani 2017).

The Wind Energy Conversion System (WECS) advancement is based on the use of permanent magnet synchronous generator owing to its higher efficiency than the other generator based systems. Besides the other advantages has been outlined on the fact that it does not require a DC supply for excitation circuit and that eliminates need of slip rings and does not require condensers for maintaining the power factor (Nagalakshmi Prasanna, Chousain Basha, and Vara Prasad 2017; Alsumiri and Althomali 2017).

A sensor-less output power maximisation scheme of a PMSG based wind generation system has been developed. The generator torque has been suitably controlled in accordance with the generator speed to allow wind turbine power to attain Maximum Power Point (MPP). The experimental results obtained without



Design of Linear Quadratic Regulator Based Controller for Hybrid Solar-Wind Driven Micro-Grid Inverter

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Abstract

The paper incites to plan a linear quadratic regulator (LQR) based actuator with a view to enhance the standard of power delivered to the load from a Micro-Grid inverter in a standalone distribution system. The hybrid solar and wind sources through their respective converter interfaces constitute the dc input to the system. It engages a maximum power point tracking (MPPT) actuator in order for regulate a new familiar dc bus voltage and allow to exploit both the sources in accordance with their availability. The main thrust owes to introduce the principles of the LQR for arriving at the appropriate reference which along with the carrier serve give rise to the pulse width modulation (PWM) pulses for the switches in the inverter. It engages to vary the modulation index of the inverter in an effort to reshape the reference wave and there from reduce the total harmonic distortion (THD) producing the voltage besides lowering the harmonic spread factor (HSF). fresh scope for the use of the formulation in practical hybrid renewable energy driven utilities. The simulation results obtained using MATLAB software demonstrate the effectiveness of the methodology through lower values of

SMALL SIGNAL PERTURBATION ANALYSIS FOR PARALLEL MICRO GRID INVERTERS

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ABSTRACT

The paper orients to evolve a framework for ensuring the stable operation of the inverters connected in parallel within a Micro grid. It develops a model of the N parallel inverter system through the use of the state space averaging technique and introduces the theory of linearized perturbation technique to arrive at the equilibrium state around the chosen quiescent point. The system operates from a solar source and it has a SEPIC (Single Ended Primary Inductor Converter) which exploits the use of the maximum power and in turn support the parallel inverters. It engages the design of a linear quadratic regulator (LQR) controller in an effort to increase the power quality indices of the output voltage. It examines the performance using MATLAB based simulation from where it offers a regulated output voltage and a reduction in the total harmonic distortion (THD) and the harmonic spread factor (HSF) across the operating range. The experimental readings obtained from the prototype fabricated using AT Mega 8 processor serve to validate the simulation results and establish the suitability of the use of the system in real world applications. The frequency domain plot assuages the steady state stability and claims a space for its use in the stand alone utility grids.

Key words: Single Ended Primary Inductor Converter, Linear Quadratic Regulator,
Total Harmonic Distortion and Harmonic Spread Factor

Fuzzy Logic Controller based Zeta Converter for BLDC Motor

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Abstract— This proposed paper presents fuzzy logic controller (FLC) based zeta converter for BLDC motor. To obtain a constant voltage, a Fuzzy Logic Controller is proposed. Through a zeta converter and a Fuzzy Logic Controller (FLC), a constant output voltage is maintained even at voltage sag and surges. Hence, the efficiency of BLDC motor is improved and torque ripple is reduced. This provides a powerful representation and good result for measurements of uncertainties present in obtaining a constant DC output.FLC are investigated sing MATLAB-Simulink tool. Result shows that fuzzy logic controller based zeta converter for BLDC motor can produce desired output when compared to traditional PI-controller

Keywords— Zeta Converter, Fuzzy Logic Controller (FLC), Mamdani Algorithm, BLDC.

I. Introduction

Efficiency and torque ripple reduction are two main factors which decide the selection of a motor for household applications. Other major concerns are the power quality issues such as sag and swell produced by the input supply.

Brushless DC motors make a challenging environment with other brushed DC motors; because of their good efficiency, low electromagnetic interference problem and wide range of speed control capacity. So BLDC motors are mostly recommended for many low and medium power applications such as electric traction, air conditioning and robotics etc.

One of the major drawbacks associated with a PMBLDC motor is torque ripples [2, 17]. Many research works are progressing on the torque and current ripple reduction in PMBLDC motor. Generally, rectangular phase current is considered to be ideal for two phase conduction mode PMBLDC motor. [1, 7]At any time only two phase conduction is possible in two phase conduction mode which lead to Current pulsation[3]-[5]. Torque ripples will cause rotor and bearing damage, so the life of the motor reduces. Fuzzy logic controlled BLDC motor will produce less torque ripples when compared with PI- Controller

BLDC is an electronically commutated synchronous motor, with permanent magnets on the rotor. By using rotor position sensor firing pulses for each phase current of Brush Less DC motor is synchronized. Instead of mechanical commutation electronic switches are provided for proper commutation.

II. PI Controller based Zeta Converter for BLDC Motor

A. Zeta Converter

Zeta converter uses single MOSFET switch so that complexity of the converter operation decreases. Using Controller the gate pulse to zeta converter can be controlled. The zeta converter belongs to 4th order converters that can step up or down the input source voltage according to the PWM given to the gate. Fig.1 shows the circuit diagram of a PI controller based Zeta Converter Various modes of zeta converter operations are listed below.

In mode -1 the MOSFET is in ON condition and input energy is transferred to the input inductor L1 and output inductor L0 through capacitor C1, so the inductor currents increases linearly.

In mode-2 the MOSFET will be turned OFF. Due to the conduction of diode the load is energized by the charged inductors and by using the output capacitor the voltage across the load is maintained constant.

In Mode 3 (freewheeling mode) voltage across inductances are zero, but their currents are constant.

Component Count Reduced, Filter less H-Bridge Multilevel Inverter with Series and Parallel Connected Switches

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This paper introduces a new premium multilevel inverter (MLI) topology with cascaded H-Bridge and series-parallel connected switches to synthesize the fundamental sine wave with various levels of voltage. The component count is decreased by reducing the number of power switching devices, opto-isolators, voltage gate drivers, snubber and filter circuits. The combination of two power switches and a separated dc source (SDC) is called as SDC module. Five SDC modules are required for a 63-level MLI and six SDC modules are required for a 127-level MLI. In this paper, both a 63-level and a 127-level filter-less single phase MLIs are deliberated. The switches are controlled by employing a newer pulse width modulation (PWM) technique called periodic reduced digital carrier level shift PWM (PRDCLSPWM). As the number of level increases to a greater extent, the total harmonic distortion diminishes without the need of filter circuit and the performance level also increases. Comparative analysis of proposed 63-level and 127-level MLIs topology with the conventional and modern topologies have been presented in terms of power switches, gate driver circuit requirement, dc voltage sources and THD limits. PRDCLSPWM scheme is derived and analyzed for the proposed 63-level and 127-level MLIs to eliminate low order and high order harmonics. Moreover, the performance of the proposed modulation scheme is compared with the most commonly used schemes. The modeling and simulation are done with MATLAB/SIMULINK 2016a.

Keywords: Component count reduction, Series-Parallel connected switch multilevel inverter, Total Harmonic Distortion.

1. Introduction

DC to AC conversion is a key innovation in the advanced set-up of electric utilities. DC to AC converters ("inverters") assume a critical job in factor recurrence drives, uninterruptible power supplies, enlistment warming, high voltage DC power transmission, electric vehicle drives, static var compensators, dynamic channels, adaptable AC transmission and DC power source usage, (for example, power got from batteries, sunlight based boards or energy units). The structure of MLIs for the most parts relies upon the quantity of DC supplies, DC-interface capacitors, and number of switches, voltage levels, and yield power quality¹. Three general staggered inverter topologies are flying capacitors, impartial point clamped (IPC), and cascaded H-Bridge connect multilevel inverters (CHBMLI). In view of the idea of the yield wave form, inverters can be named as square wave inverters, semi square wave inverters, two-level PWM inverters and staggered inverters². Among these topologies, the CHB inverter has special focal points in measured quality and its commitment of high power. These preferences make the CHB inverter an appealing choice for some applications, for example, uninterruptible power supplies (UPS), grid associated system, STATCOM, locomotive drive, etc. The IPC MLI omits clamping diodes to create the voltage levels. Various clamping diodes, DC-link type capacitors, and switches are required to create a higher voltage level. Voltage unbalance, switching misfortune, and conduction misfortune in IPC MLI³ have constrained its utilization for the industrial applications.

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Design of Multi Purpose Charger Using an L2C Resonant Converter

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For over a decade, electricity-supply industries have extensively implemented the LLC (inductor, capacitor) collection resonant converter (L2C-SRC). An L2C-SRC has a soft-switching nature without a complex manage scheme. Its gentle-switching function allows the usage of components with decrease voltage scores and additionally presents excessive converter performance. Despite the fact that an L2C-SRC can reap a good deal higher efficiency than tough-switching flyback and forward converters, there are nonetheless more than one design challenges to reap the first-class performance. The modern in a sequence resonant inductor L_r is fully ac with none dc content-manner excessive magnetic flux density variations (δb is high). High δb approach excessive ac-associated inductor losses. A big inductance on L_r manner extra activates the inductor and higher ac winding losses. Excessive δb generates extensive losses on the resonant inductor-both a excessive winding loss or a excessive core loss. A 2nd challenge in an L2C-SRC layout is the way to best optimize synchronous rectifier (SR) control. To cope with those two challenges, on this paper, a high performance L2C resonant converter is deliberate with an tremendous voltage regulation ability which could correctly extort the most strength as of the Photo voltaic panels as well as react to the battery condition of fee at accurate voltage and current tiers. The L2C circuit simulated using MATLAB/SIMULINK 2016 software. The maximum power point monitoring (MPPT) P&O algorithm is applied to get maximum energy.

Keywords: Photo Voltaic Panel, DC-DC Voltage Regulation, Soft Switching, Resonant Converter, MPPT.

1. INTRODUCTION

DC-DC electricity converters among changeable voltage benefit as well as boosting features are along with the indispensable components for Photo voltaic power structures, for the cause that highest strength must be extorted as of the stumpy voltage, changeable penetrate source and enhanced to a patronizing voltage echelon [1-3]. In Photo Voltaic power systems for electric automobiles (EAM) among rooftop Photo voltaic panel, this is furthermore crucial to rent a rechargeable battery faction to accumulate power and release it afterward [4-7]. Using battery bunches for power garage inflicts difficult layout restrictions for the potency converter, because of the distinctive battery running modes, inclusive of regular current, regular voltage, regular strength, and no-load stipulation [8]. The concoction of a Photo voltaic plate as well as a chargeable battery in a power system entails excessive voltage advantage. Dissimilarities from the input ($V_{\text{photo voltaic}} = 24 \text{ V}$ to 45 Vdc) to the output ($V_{\text{bat}} = 60 \text{ V}$ to 230 Vdc), and this

wishes to be supported with the aid of sun battery chargers. In this example, the charger be supposed to not most effective music the input voltage deviation if you want to extort the most to be had power as of the Photo voltaic board, but also enhance the enter voltage in step with the level of changeable benefit and reply to the battery exclusive status of charge. Currently, special research was devoted to growing dependable and well-organized non-isolated as well as isolated electricity converters used for Photo Voltaic applications. Non-isolated energy converter topologies which include be really utilized in Photo voltaic systems-comprise enhance converters, cockcraft and walton multipliers, united inductors, switched inductors in addition to capacitors by means of patronizing voltage benefit functionality because the DC-DC energy translation level for Photo voltaic to grid programs (boosts a low, variable penetrate voltage of 30 Vdc - 50 Vdc to a lofty, permanent yield voltage of 400 Vdc) [9-10]. Despite the fact that non-isolated electricity converters can correctly enhance the Photo voltaic voltage and attain extreme on the whole performance, they're now not advocated for

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Fault Diagnosing Technique For Replacing Damaged IGBT Device In Induction Motor Drive

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Abstract

This paper presents a substitution of the damaged power device in open and closed loop control for for fault tolerant towards an Induction Motor Drive (IMD). It depends on fuse blown strategy and early recognition of failure of the power device. The auxillary (Insulated Gate Bipolar Transistor (IGBT) is subbed in each stage and the method actualized is classified "Single Phasing Technique" (SPT). In an Induction motor, the strategy previously utilized was to distinguish short circuits (or) open circuits disappointment in power drives. Be that as it may, there was no substitution had made for damaged component. Fault location must be observed so as to avoid extremely high current during issue time by short circuit of power device. Presently in this paper the damaged power component is substituted in suitable time with appropriate spread time delay and along these lines the drive will run with no interferences and henceforth the following interventions are checked or recognized during transient condition. By taking care of this kind of method, the solid activity can be accomplished for an acceptance engine drive utilizing IGBT. The simulation and exploratory outcomes are acquired so as to approve the procedure proposed.

Key words: Induction Motor Drive (IMD), Insulated Gate Bipolar Transistor (IGBT), Single Phasing Technique (SPT).

1. Introduction

This paper discusses a rapid growth in developing a system without fault which makes the equipment more reliable in active and passive fault control. The active way deals in determining the size and location of fault and its diagnosis of fault tolerant mechanism. The passive way deals the sensible for finding certain failure in a closed loop system. For reducing the corresponding problem, there is in need to undergo the solution known as fault tolerant mechanism. The fault tolerant mechanism enrolls certain mechanism like replacement of damaged element. Under such case we an active IGBT by means of bidirectional switches consists of poles are provided. Consider a three phase induction motor, there are three pairs of IGBT connected across its frame work. In case any one pair of IGBT undergoes fault at any phase, a pair of another IGBT known as "auxiliary IGBT" is provided and the drive can run without any interruption.

Pseudo-Derivative Feedback Controller for Automatic Generation Control in a Deregulated Power System with Hydrogen Energy Storage

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ABSTRACT

This paper is focused on design and application of Pseudo-Derivative Feedback (PDF) controller for Automatic Generation Control (AGC) of a two-area thermal reheat interconnected power system treated in deregulated condition. The proposed controller gains are tuned simultaneously using Flower Pollination Algorithm (FPA) in order to achieve the optimal transient response of the test system. The control performance of the PDF controller is compared with Proportional Integral (PI) and Proportional Integral Derivative (PID) controllers. Further to improve the AGC performance, Hydrogen Energy Storage (HES) are included in its control area. The execution of HES unit captures the underlying fall in frequency as well as the tie line control power deviations after a sudden load unsettling influence. The simulation results demonstrate that the proposed PDF controller enhance the dynamic response of the deregulated power system as compared with PI and PID controller. The frequency oscillation and tie-line power deviations in the control zones are reduced and the settling time is additionally enhanced when HES unit takes an interest in the frequency regulation along with the traditional generators. Additionally, the Power System Restoration Indices (PSRI) is figured in view of system dynamic performances and the remedial measures to be taken can be decreed. These PSRI shows that the ancillary service requirement to enhances the effectiveness of physical task of the power system with the expanded transmission limit in the system. The presence of an Hydrogen Energy Storage (HES) water electrolyser coupled to a fuel cell improves significantly the control and operation of an energy system and provides good margin of stability of the grid system compared to that a system without HES unit.

Keywords: automatic generation control, flower pollination algorithm, hydrogen energy storage, PDF controller, power system restoration indices

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1. INTRODUCTION

The supply of stable and reliable power to the consumer is the primary concern of an interconnected power system framework. Because of the dynamic idea of load, it is important to keep up the harmony between generation and load demand. There by enhancing the execution of the generating unit of frequency and tie line power should be confined in prescribed limit is known as Automatic generation control (AGC).

A critical up-to-date literature review explaining all aspects of AGC is reported in [1-3]. In deregulated environment there are certain market players like generating companies (Gencos), distributing companies (Discos) and transmitting companies (Trancos). This means the power industry is divided into three different sectors and the bidding between Discos and Gencos is controlled by the Independent System Operator (ISO). In such a new scenario, Discos can autonomously make agreement with Gencos for delivery power to meet the demand of the consumer. An ISO is a self-governing agent that manages all the transactions alleged between Discos and Gencos. A Disco Participation Matrix (DPM) is used for hallucination of bonds between Gencos and Discos [4, 5]. Regarding few secondary controllers namely, proportional-integral (PI), proportional-integral-derivative (PID) are found in the literature of AGC. These controllers are the first stage closed loop controllers designed for overcome the limitations of open loop control system. The performances for Integral (I), Proportional-Integral (PI), Integral-Derivative (ID), and Proportional-

Integral-Derivative (PID) controllers in AGC are practically the same from the viewpoint of dynamic responses [6]. However, the proposed Pseudo-Derivative Feedback controller (PDF) gives much preferred reaction over the previously mentioned controllers. In this study PDF controllers are planned and actualized utilizing FPA calculation in AGC circle of the interconnected restructured power system. The test results demonstrated that the precision and speed execution of the PDF controller had beaten the other PI and PID controller.

Many looms such as Particle Swarm Optimization (PSO), Genetic Algorithm (GA), Biogeography-Based Optimization (BBO), Krill Herd Algorithm (KHA), Teaching Learning Based Optimization (TLBO) and Bacterial Foraging Optimization (BFO) algorithm have been planned to resolve the control parameters of a several standard controllers to solve the AGC problem. A wide range of control approaches along with their compensation and boundaries is given in [7-9].

Big Bang Big Crunch (BBBC) is an optimization based on the big bang theory and big crunch hypothesis [10, 11]. From written study, the improvement of power system execution relies upon the control structure as well as on the very much tuned controllers. For this reason, a number of artificial optimization techniques are utilized. So another superior heuristic advancement algorithms are constantly welcome to take care of genuine issues. Flower Pollination Algorithm (FPA) is a newly developed heuristic optimization method based on Pollination of flowers. It has a single key parameter

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A new approach for commutation torque ripple reduction of FPGA based brushless DC motor with outgoing phase current control

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ABSTRACT

Brushless Direct Current Motor (BLDC) has been deployed across several kinds of applications. However, attaining a smooth torque ripple with fast response is relatively tough, as usually this is based on the varied slew rate line current in the commutation period. Hysteresis Current control has been widely used in earlier works for the maintaining incoming and outgoing phase current at the same rate throughout the commutation period. Additionally, this also helps in reducing the commutation torque ripple and delivers successful commutation. The proposed work here uses a relatively simple control technique that is primarily derived on the basis Outgoing-phase Current Discharge Hysteresis Control (OCDHC). This has been characterized to produce low response time and reduced torque ripple which has been suggested to execute in both conduction and commutation intervals. For the implementation of digital controller, we chose Xilinx Spartan 6 FPGA board. The digital controller algorithm is written using VHDL and is dumped on the FPGA. For this purpose we use Xilinx ISE and iMPACT tools. FPGA receives hall sensor output and current from BLDC motor with reduced torque ripple and generates the gate pulses which drive the IGBT switches using OCDHC control. This condition shows that the performance of the system is not primarily based on the motor parameters, excluding the stator resistance. Lastly, results obtained from the simulation and experimental results validate the significance of the proposed control technique based on response time at load conditions that vary at different junctures.

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1. Introduction

In recent decades, there is an increasing popularity of BLDC drives as it delivers increased torque to weight and inertia ratios, high levels of power density and efficiency, compact size, dynamic response, reliability as well as simple control. There has also been extensive use of BLDCMs with trapezoidal back-EMF in varied application fields including medical, industrial, etc., [1–3]. Reliability is relatively high in BLDCMs that are electronically commutated as it requires far less maintenance as high-wear parts like the standard mechanical commutator and brush assembly elimination is not necessitated [4]. But, pulsating torque is considered as the major concern in BLDCM. The trapezoidal back-EMF waveform in the BLDCM has a stator that is essentially supplied by a quasi-square wave line current. In general there is torque ripple that results on account of phase winding self-inductance distort the ideal quasi-square wave line current [5]. Torque rippled engendered herein is referred to as Commutation Torque Ripple (CTR). CTR's theoretical

deviation has been given wherein CTR with speed is seen to account for almost 50% of the average torque [6]. Additionally these in sensor less motor drives result in generating noise, vibrations as well as serious faults [7].

In general, BLDC motor operation could be formulated into two distinct periods such as the Commutation Period (CMP) and Conduction Period (CNP). The operation mode control strategy and stator flux of CPM, are very much relevant with regards to the three-phase ac motor with respect to all the three phases. On the other hand, the operation mode control strategy and stator flux in CNP are similar with respect to the DC motor with only two-phases. Thus, since the operation of BLDC motor combines both AC and DC operation, it is called a hybrid machine.

Resultantly on account of the control strategy, there arises CTR issue for the BLDC motor during the CMP operation. There is a marked variation that is evident in the current slew rates that exists between both the incoming phase (ICP) and out-going phase (OGP) which in turn is assumed as the primary reason for CTR [8]. Hence to lower CTR, it is necessary for the sum of both current slew rates of OGP and ICP to be zero. In this scenario, the conduction phase current is not varied during CI.

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Synthesis, growth, XRD, NLO, CHNSO, structure by theoretical approach, dielectric, absorbance, photoconductivity and bio studies of 4-(4-Acetyl-5-Methyl-1H-1, 2, 3-Triazol-1-yl) Benzonitrile crystals for optical, opto-electronic, and photonics utilities

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ABSTRACT

4-(4-Acetyl-5-Methyl-1H-1, 2, 3-Triazol-1-yl) Benzonitrile—AMHTYB crystal is effectively synthesized and grown successfully by slow-evaporation technique. The grown sample is monoclinic in nature which is identified by single-crystal XRD data analysis and its chemical formula is identified to be $C_{12}H_{10}N_4O$. From the NLO study, the titled crystal is found to be 1.24 times than that of the crystal of KDP for NLO-SHG efficiency and is good for the optical applications. The AMHTYB crystal is subjected to dielectric and photoconductivity study, the synthesized crystal is a -ve photoconductive type of material and is of good material for electronic industry based on its effect on dielectrics. The absorbance cut-off is identified by UV-visible spectrum as 291 nm and the energy gap as 4.27 eV by Tauc's plot for photonic effectiveness; the elemental calculations by CHNSO and by theoretical manner and the structural revelation by

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EFFECTIVENESS OF ONLINE TEACHING AND LEARNING PROCESS IN SEMI URBAN AREAS- AN EMPIRICAL STATISTICAL STUDY

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ABSTRACT

Online teaching is becoming a necessity for the students to learn things in the Covid19. Many of the educational institutions are still closed due to the pandemic, but the learning process is in progress with the support of online teaching. It helps the students to learn courses from their teachers, complete assignments, and equip themselves. The purpose of the study is to find out the effectiveness of online teaching among the students of semi-urban areas. The research behind choosing the topic is to analyze the impact of online teaching on students learning and the facilities available to access the content online. In this study, the researcher studies the effectiveness of online teaching among the students in semi-urban areas of Nagapattinam district, South India. The researcher has chosen 117 samples to measure the effectiveness of online teaching in educational institutions. The research has reached the conclusion based on the results.

Keywords: education, semi-urban students, online learning, technology, interest in learning

INTRODUCTION

The journey towards education is demanding the learners to improve their competence in the area of online learning. To attain the destination of knowledge in education, a continuous learning concept should be incorporated among the students. The face of learning has been changing in different situations and periods. It would have started from Gurukulam- the students stayed at teachers' home and learned to schools and learning courses using online. The concept of teacher-centric has drastically reformed and students' centric education has been implemented. The school of education highlights the concept of outcome-based education and not output-based education. The students are assessed not only for the performance but also for their attitude. Online learning can be effectively done through the transformation and integration of knowledge between the teachers and students.

The present education is giving a new direction to education. The fast and furious development of technology in the present world gives many avenues to the learners to equip new concepts through various modes of learning. There are various methods to learn the concept from pen and paper to technology-based learning such as iPod, tablet, kindle, laptop, smartphone, etc., At the same time measuring the retention rate of the students who have chosen online-only degrees are difficult to measure because many students have opted both online and on-campus courses (Brown, V.S., Strigle, J., Toussaint, M. (2020). In this techie scenario, the usage of smartphones is inevitable to learn much information. During this pandemic situation, many of the schools, colleges, and universities are conducting classes through online mode such as taking classes, giving assignments, conducting group discussion, presenting. Haythornwaite, C., & Andrews (2007) the students get rich technology-based knowledge and have interaction with other knowledge-sharing sites inside and outside the classroom. Bozkurt and Sharma, 2020, Quintana and Quintana, 2020, Sabu, 2020 specified in their studies that intellectual and corporal well being is to be given primary importance by the educational institutions than focusing on curriculum.

This study is mainly focused on the effectiveness of online classes among the students who are being in semi-urban areas within Nagapattinam District, South India. Online teaching is an inevitable part of the students learning environment in this pandemic situation. The Ministry of education is striving to enrich the knowledge of students through different forums like NCERT, SWAYAM, NPTEL, HEI, etc., Many research-oriented programs are initiated by the Government bodies such as DST, MNRE, ICSSR, TNSCST, etc., to motivate the student's research knowledge with financial support. Effective implementation of all the practices can be done with well-trained and motivated teachers. The success of online education depends on the efficient teacher,

A New Approach to Fuzzy Unconstrained Non-Linear Programming Problems

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Abstract

In this paper a new method is proposed to solve fuzzy Unconstrained Nonlinear Programming Problem with the decision parameters as triangular fuzzy numbers. The optimal solution is obtained by Broyden-Fletcher Goldfarb-Shanno method and Fletcher Reeves method by converting fuzzy Unconstrained Nonlinear Programming Problem to its parametric form. The proposed method is illustrated by an example.

KEYWORDS : Nonlinear programming, unconstrained minimization, Triangular Fuzzy Numbers.


INTRODUCTION

Nonlinear programming (NLP) is the process of solving an optimization problem where some of the constraints or the objective function is nonlinear. An optimization problem is one of calculation of the extreme of an objective function over a set of unknown real variables and conditional to the satisfaction of a system of equalities and inequalities, collectively termed constraints. It is the subfield of mathematical optimization that deals with problems that are not linear.

Fuzzy programming is one of many optimization models that deal with optimization under uncertainty. This model can be applied when situations are not clearly defined and thus have uncertainty, or an exact value is not critical to the problem. Bellman and Zadeh [7] introduced the concept of decision making under fuzzy environments. Tanaka, et al [10] first proposed the concept of fuzzy optimization on general level.

Many authors have studied optimization problems in fuzzy environment. Pirzada and pathak [13] introduced the Newton's method for solving unconstrained convex optimization problems with fuzzy valued functions. Abbas Akrami, Majid Erfanian [2] proposed an interval nonlinear programming approach for solving a class of Unconstrained nonlinear fuzzy optimization problems.. In this paper Broyden-Fletcher-Goldfarb-Shanno (BFGS) algorithm and Fletcher Reeves methods are proposed to solve the UNFMP with the decision parameters to be triangular fuzzy numbers.

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METHOD TO FIND EXTREMUM VALUES OF FUZZY NON-LINEAR EQUATIONS

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Abstract

In this paper a partial derivative method is introduced to find extreme values of fuzzy nonlinear equations with the decision parameters as triangular fuzzy numbers. The extreme values are obtained by converting fuzzy nonlinear equation to its parametric form. The proposed method is illustrated by an example.

1. Introduction

Nonlinear programming is the process of solving an optimization problem where some of the constraints or the objective function are nonlinear. An optimization problem is one of calculation of the extrema (maxima, minima or stationary points) of an objective function over a set of unknown real variables. In practical problems there exist uncertainties and to overcome such uncertainties fuzzy approaches are used.

Many researchers proposed fuzzy mathematical programming concepts with respect to uncertain constraints. Bellman and Zadeh [5] published his paper in the concept of decision making under fuzzy environments. Goutam Kumar Saha [9] developed a new approach to fuzzy non linear equations using fixed point iteration. S.Abbasbandy [3] proposed Newton's method for solving a system of fuzzy non linear equations. Angel Garrido [4] analyzed fuzzy extrema via measure theory.

Abbas Akrami [2] proposed an interval nonlinear programming approach for solving a class of unconstrained nonlinear fuzzy optimization problem. Behra, S.K.Nayak [6] studied fuzzy nonlinear programming with linear constraints. An optimal solution of fuzzy non linear programming problems introduced by A.Kumar and J.Kaur [11]. V.D.Pathak and U.M. Pirzada [13] investigated the optimality conditions for nonlinear fuzzy optimization problems.

In this paper, a partial derivative method is proposed to find the extreme values of fuzzy nonlinear equation with two variables where the decision parameters are triangular fuzzy numbers. The nonlinear equation is converted into its parametric form using α -cuts and obtained sub problems are solved numerically by a new method.

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OPTICAL ATTENUATION MODELLING OF $PbSe_xS_{1-x}$ QUANTUM DOTS WITH VEGARD'S LAW AND BRUS EQUATION USE

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Lead Selenide Sulphide ($PbSeS$) nanomaterial, a chalcogenide semiconductor which has maximum radiation attenuation can be tuned for required wavelength in the range from ultraviolet to infrared. Hence it has received much interest among researchers. Further, the electronical and optical properties of $PbSeS$ Quantum Dots were modeled by Brus Equation, Vegard's law and Interpolation principle calculations. Therefore, in this paper, we have studied the progress and structural parameters of $PbSeS$ at different energy band gap and wavelength. The obtained results confirms that the attenuation of radiation versus wavelength is inversely proportional to the bandgap and also the mole fraction of lead increases with decrease in energy band gap. These findings confirm the quantum effects of the material and which can be utilized in solar cell and optoelectronics applications. The results are compared with available experimental data that supports the validity of the model reported.

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Keywords: Quantum dots, $PbSeS$, Optoelectronics, Solar cell, Brus equation

1. Introduction

Generally, nano-sized materials are considered as promising candidates for recent research applications in various fields. Specifically, quantized semiconducting nano crystallites are called as Quantum Dots (QDs) or Nano Dots and a typical QDs composed by a few hundreds of atoms. One of the most important property of functional QDs is controlled attenuation of radiation and high photo-stability at required wavelength. These properties can be applied in various optoelectronics and solar cell applications. The nonlinear and linear optical properties of QDs and its quantum confinement effects can be analyzed by invoking quantum confinement phenomena [1-3]. The Density of States (DOS) highlights the features of Quantum confinement effects in zero dimensional Quantum Dots system. The DOS of QDs system describes the density of available energy states per unit energy [4]. For QDs systems the confinement produces series of discrete energy levels which explain the atomic effects of QDs relating to electrical and optical properties.

In semiconductor nanomaterials, the electron-hole pair created by absorption of photon is called as exciton. The energy required for an exciton creation is slightly lower than energy band gap of the material due to Columbic interaction between hole and electron. After this process the exciton ends as the electron-hole pair combines [5]. The quantum confinement effect occurs when nanomaterial's radius is smaller than the exciton Bohr radius, in such case the quantization of energy levels occurs as in Fig. 1. The optical spectroscopy result of quantum confinement confirms the changes in absorption of light with different energy levels of the material. The larger QDs exhibits red shifted with small energy band gap and smaller QDs exhibits blue shifted with large energy band gap.

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On the Corrosion behavior of 4A and 5A cast duplex stainless steel under different heat treatment conditions

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Abstract. In this analysis, corrosion efficiency and mechanical properties of duplex stainless steel castings (DSS-4A and DSS-5A) were compared to their wrought counterparts. Cast duplex stainless steel DSS-4A and DSS-5A are characterized in two separate solution treated settings, while their wrought counterparts are characterized in both solutions treated and forged form. Optical microscopy and X-ray diffractometry were employed to perform the metallurgical characterization. Electrochemical techniques such as Tafel extrapolation and electrochemical impedance spectroscopy were used to investigate corrosion activity. An electrochemical workstation was used to perform the corrosion studies. To compare the stability and changes in corrosion properties of both grades, an ASTM standard B117 salt spray test was performed in a 3.5 percent NaCl medium. Without any intermetallic phases, the XRD showed austenite and ferrite phases. The elements were partitioned further into the phases that they promoted, according to the elemental study of the phases. The ultimate tensile strength and hardness values of DSS-5A are higher than those of DSS-4A. DSS-5A had a higher corrosion resistance than DSS-4A. When comparing the two media used (H₂SO₄ and NaCl), DSS-5A demonstrated superior corrosion resistance.


Keywords: Aluminium – DSS, EIS, XRD, Corrosion, EDS

1. INTRODUCTION

Owing to their improved pitting and stress corrosion cracking resistance, duplex stainless steels (DSS) are being specified for chloride-containing environments. They outperform austenitic stainless steels in terms of corrosion resistance. Duplex stainless steels have better strength properties and come in a variety of wrought and cast forms.

Duplex stainless steels (DSS) have two phases in almost equal proportions: ferrite and austenite. The arrangement of the two phases is highly dependent on their composition and thermal background. Because of its excellent mechanical and corrosion resistance, duplex stainless steel is used in the pharmaceutical, petrochemical, nuclear, marine, and paper industries^{1,2}. It has a unique combination of properties, including high corrosion resistance in chloride-ion-rich settings, mechanical strength and ductility, abrasion resistance, and weldability³⁻⁵. Around 1937, the commercial development of duplex stain-free steels began⁶⁻⁸.



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Influence of Ni addition on Abrasive wear behaviour of plasma-sprayed Duplex stainless steel coatings

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Abstract: Many austenitic and ferritic stainless steels have a higher yield and ultimate tensile strength than duplex steels. The extent to which this is true is determined not only by the alloy's composition but also by how it is treated. This increased strength is usually accomplished without sacrificing the alloy's hardness, as long as the alloy does not contain any of the harmful phasing elements. Thus an attempt is made to study the duplex stainless steel being plasma sprayed on a substrate and study its microstructure, hardness, and abrasive wear resistance. The primary objective is to study the abrasive wear resistance of duplex stainless steel coatings on 316 stainless steel. Ni percentage in coatings is varied at the coating stage in weight percentages of 7.0, 7.5, and 8 % and to study its effect on the wear rate of the coatings. The composition of the coatings is confirmed using XRD. A two-body abrasive wear test is carried out to determine the wear rate of the coatings with varying percentages of Ni and varying loads. Besides, the coatings are characterized by optical microscopy. Weight loss measurements of the tested samples are carried out and the data obtained is analyzed through weight loss plots. Also, weight loss data is used to further calculate the wear rate which is analyzed using wear rate plots. Finally, the microhardness of the coatings is determined.

Keywords: Duplex stainless steels, Abrasive wear, Optical microscopy

1. Introduction

In the chemical and petrochemical industries, duplex stainless steel (DSS) grades are widely used. The key advantages of duplex stainless steels are their excellent resistance to oxidation, corrosion, and stress corrosion, as well as their superior mechanical properties [1-4]. These alloys have general corrosion rates that are similar to, if not lower than, austenitic stainless steel. In dilute sulfuric acid, these alloys have the same or lower general corrosion rates as austenitic stainless steels. This is true for dilute hydrochloric acid as well as caustic solutions used in the pulp and paper industry. Any of these alloys can also be used in organic acid environments. As compared to austenitic stainless steels, many of these alloys have better pitting and crevice corrosion resistance [5-7].

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Improving the performance of mortar containing industrial wastes

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Abstract

Solid waste generated from manufacturing industries are consistently increasing. One such industrial solid waste is foundry sand. Foundry sand are partially replace the fine aggregate. The tests on the physical properties are specific gravity, dimension and mass were accepted out in according to obtain the mixture. The fine aggregate is partially replace with the foundry sand by different proportions 10%, 20%, 30% in normal mortar. The cement is replaced by GGBS and Silica fume (SF) in 5%, 10%, 15%. The ratio of mortar mix used here is 1:4. 53 grade ordinary portland cement is use in the project. The compressive strength, split tensile, flexural strength of specimen are found at 7 days and 28 days and compared with the normal mix to find the influence of foundry sand, GGBS and Silica fume in cement mortar.

 Previous

Next 

Keywords

Cement mortar; Foundry sand; GGBS; Silica fume (SF)

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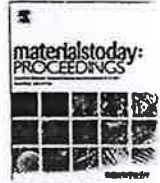
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Effect of steel fibre on fracture toughness of concrete

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ABSTRACT

The project focuses on fracture toughness of steel fibre reinforced concrete. M30 grade concrete is used in this project. 5%, 10%, 15%, 20%, 25% and 30% of Ground Granulated Blast Furnace Slag (GGBFS) is replaced with cement. The hooked end steel fibre addition is kept constant as 3% by weight of binder content. 5%, 10%, 15%, 20%, 25%, and 30% of foundry sand is replaced with fine aggregate. Specimens of size 500 × 50 × 50 mm are used with notch of constant width 3 mm with notch depth ratios of 0.1, 0.2, 0.3, and 0.4. The fracture toughness is determined by using three-point bending test. The results are compared with the results of ordinary concrete mix.

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1. Introduction

Concrete is the most versatile material used in the field of civil engineering. Concrete is used in large quantities almost everywhere mankind has a need for infrastructure. Loading effect, shrinkage, and various factor are formed cracks in the fibre-reinforced cementitious composite material. Fibres are very strong and stiff, and bond well with the cement matrix, limiting crack width and the FRC can carrying stress even after relatively large amount of deformations after cracking the specimens. Thus, fibres to have ductility of cementitious composites materials after cracking, improve the value of FRC toughness [1–6]. According to EN 14651, flexural strength test was performed on notched beams 0.10, 30, 40, and 50 kg/m³ volume fractions of arched and hooked end type fibre were added. As results, all fracture parameter was increased with fibre volume fraction up to 40 kg/m³. values of ASFRC is higher than reinforced with hooked-end type steel fibre [7], notched prisms with a/D ratio equal to 0.4 was used. Three-point bending test is carried out. The values of ultimate load, fracture toughness, fracture energy, ductility and were measured conventional concrete (PCC) of same grade and the fibre content was varied from 0 to 0.75% with an increment of 0.25% [8]. An experimental study of the fracture energy of concrete reinforced

with natural fibres of hemp, elephant grass, and wheat straw. 0.19% of fibres are containing concrete specimen by the weight and of 40 mm of length were uniaxial tested with the wedge splitting test (WST) method is used. In the presence of fibres in concrete 4%, 7%, and 8% for hemp, straw and elephant grass reinforced specimen's tensile strength get decreased [9]. The experimental investigation of 1% and 2% of steel fibre or polypropylene fiber with plain concrete and fibre concrete cubes and notched prismatic specimens are tested [10].

2. Investigation made

2.1. Material

Ordinary Portland cement of 53 grade was used confining to IS12269-1987. Specific gravity of cement was tested as per IS 2720-Part-3 and was found to be 3.15. The aggregate which passes through 4.75 mm sieve is used. Result of Specific gravity of fine aggregate is 2.85. The aggregate was taken as a combination of 20 mm as per IS code. Specific gravity of coarse aggregate test was conducted as per IS 2386 -Part-3 [12] and resulted as 2.87. Portable water is used for casting and curing work of beams, cylinder and cubes.

Foundry sand is used with specific gravity 2.79 and GGBS is also used with fineness modulus 3.36, specific gravity 2.85. Hooked end Steel fibre has been used as reinforcing material and So, steel fibre concept is explained below, Steel Fibre: hooked end steel fibre is used in this experiment. Length and diameter of steel fibre is

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Experimental investigation of sustainable concrete by partial replacement of fine aggregate with treated waste tyre rubber by acidic nature

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ABSTRACT

A sustainable concrete is one of the essential concretes for this current environment. Increasing of automobile industry leads to produce a huge amount of waste tyres in the entire world. The disposal of waste tires continues to pose a serious threat to environmental protection and health. The main aims of this study are the utilization of Waste tyre rubber material as partial replacement for fine aggregates in M30 grade of concrete mix at different percentages to produce a sustainable concrete. It has the additional advantage of saving in natural aggregates. In this paper, a surface modification method was proposed to introduce strong polarity groups to rubber surface to generate a strong chemical bond between the rubber and the cement matrix. It is an effective method to improve the mechanical properties of concrete.

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1. Introduction

Worldwide production of tyre increases due to increase of automobile industry, it is very difficult to dispose the waste tyre as the availability and capacity of landfill spaces decreases. Currently 75–80% of scrap tyres are buried in landfills. Disposal of whole tyre has been banned in the majority of landfill operations because of the bulkiness of the fires and their tendency to float to the surface with time. Investigations have shown that scrapped rubber tyres contain materials that do not decompose under environmental conditions and cause serious problems. Based on these problems, tyres can be used as aggregates in concrete. The basic material required in construction of buildings by using concrete are aggregate and cement. India has been recycling and reusing waste tyres for four decades, although it is estimated that 60% are disposed of through illegal dumping. Recycling waste tire rubber by incorporating it into concrete has become the preferred solution to dispose of waste tires. The mechanical and durability properties of waste rubber tyre concrete with different replacement forms and volume contents had been investigated. In this study, the performance of

waste materials waste tyre rubber as partial replacement for fine aggregates in M30 grade of concrete mix at different percentages and its effect on concrete properties like compressive strength, flexural strength and split tensile strength were investigate by acidic nature. Based upon this point of view durability property with acid curing for 28 days compressive strength is to be done instead of treatment of rubber with solutions. One of the major concerns of the material is the ingress moisture and aqueous solutions or the contact with an alkaline environment when durability is considered.

Kunal Bisht and Ramana investigated the mechanical and durability properties for the different proportion 0%, 4%, 4.5%, 5% and 5.5% of Waste Tyre Rubber of concrete. It has been observed that with an increment of Waste Tyre Rubber workability of concrete decreases. The output of flexural and compressive strength slight decreases with 4% replacement of fine aggregate by rubber [1]. EshmaielGanjan et al., investigated the performance of concrete mixtures incorporating 5%, 7.5% and 10% of discarded tyre Rubber as aggregate and cement replacements in the investigation the result stated that: Compressive strength was reduced with increased percentage of rubber replacement in concrete, though with 5% replacement of aggregate or cement by rubber, decrease in compressive strength was low (less than 5%) without noticeable change in concrete properties. Tensile strength of concrete

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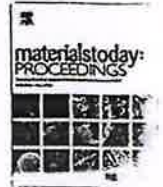
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Experimental study on effects of natural admixture on blended mortar

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ABSTRACT

The present study deals with the incorporation of the Natural admixture Egg as an admixture to the mortar and also the Silica fume and Fly ash as partial replacement materials for cement. Construction industries are the paramount key to find alternatives for the industrial byproducts. Since they possess the pozzolanic property they are used in this study for the replacement of cement. The study aims at the curing of mortar at specified temperature to compare the results that of normal mortar. The natural admixture with 3 different percentages respect to water to bind ratio are chosen and the respective results were found. The mechanical and durability properties of mortar were done to analyze the conclusion for this project. The mortar with 15% of partial replacement for cement with Silica fume and Fly ash were found to be optimum with 0.50% of Natural admixture Egg.

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1. Introduction

Mortar is a workable paste used to bind together the construction materials and also used to seal the breaches between the irregular structures. The main constituents of mortar are the cement and sand. In olden days instead of Cement the natural materials like jaggery, egg, surkhi, clay and mud were used [1]. In recent times the usage of various types of cements are found to be used due to their capacity of good mechanical strength. Even though the usage of cement has its advantages there also exists the major disadvantage of emission of carbon dioxide into the environment. So in order to overcome this disadvantage the experts found the way for partial replacement of cement with industrial by products. The usage of industrial byproducts for the partial replacement of cement has dual advantage of reducing the impact of greenhouse gas on environment and also acts as an alternative for disposal of industrial by products.

Due to over exploitation of river sand now it is usual to take advantage of the manufactured sand as a replacement material for river sand. Admixtures are used in concrete structures to enhance the setting time of concrete and some are used to increase

its strength parameters of them. There are wide range of chemical admixtures are used by the construction industries but we must use the natural admixtures like banana peel, egg, sugarcane bag gase ash, wood waste ash, etc. can be used to enrich the properties of mortar and concrete.

The present paper aims at promoting the usage of Natural admixture Egg and also the industrial by products silica fume and fly ash as partial replacements for cement, in order to make the mortar economically feasible and also to improve the strength of the mortar by making use of the natural admixture without any harmfulness to the environment.

2. Materials

2.1. Cement

The ordinary Portland cement of grade 53 was used in this study. The Standard consistency of water was 33% and the initial and final setting time of cement was found to be 35 min and 10 h respectively.

2.2. Manufactured sand

The specific gravity and fineness modulus of manufactured sand used in this experimental work was 2.73 and 4.66 respectively.

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Natural admixture in blended mortar- mechanical properties study

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ABSTRACT

In this paper a detailed review about the utilization Natural admixture Egg as an admixture and cement partially replaced by Fly ash and Silica fume. Since Egg is rich in its calcium content the mechanical properties of mortar can be influenced to great extent. By fixing the water to binder ratio as 0.45 and varying the percentages of an admixture with respect to the water to binder ratio and similarly by varying the proportions of Fly ash and Silica fume commencing from 5% to end with 20% of that of cement, different mortar specimens were casted. Acid curing is done on the mortar samplings and then the results were compared with the water cured samplings. The mechanical and durability properties of the mortars were carried out and their corresponding results were assessed.

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1. Introduction

Cement mortar is the vital material in modern day construction. Long term durability and its great compressive strength are its well-known possessions. The consumption of cement mortar is increasing gradually due to the increase in construction industries and eventually it leads to the exploitation of natural resources. In order to reduce the usage of currently available raw materials efforts are being made to replace them by other materials. Solid waste disposal problems can be reduced by using them as supplementary cementitious materials, the concrete industry is looking for those materials which can fulfill this objective of disposing the wastes. Fly Ash (FA) and Silica Fume (SF) are among the solid litters generated by industries. Industrial backlashes can be used as a partial alternative for Portland cements since there will be substantial energy and cost savings. An increased demand for cement and concrete can be met by partially replacing the cement in conjugation with Fly ash (FA) and Silica Fume (SF) in addition to the natural sand with manufactured sand.

The present study aims at the feasibility of using locally available Fly ash (FA) and Silica fume (SF) as partial replacements for

cement. By doing this, the objective of reducing the construction cost and the problems associated with the disposal including environmental problems of the region can also be met.

In modern constructions the usage of Chemical admixtures is an inevitable one. By using those chemical admixtures in concrete there will be reduction in water demand and also they can improve the properties of concrete [1]. Even though the usage of chemical admixtures provides better structural properties these are also responsible for environmental pollution. Impact of chemical admixture on environment can be seen when those concretes in these chemical admixtures are exposed to environment. Thus, it is anticipated to find alternative admixtures that can provide better concrete properties, also doesn't produce adverse effect on environment.

The usage of Natural organic materials can provide concrete with better properties without affecting the environment [2]. Therefore in this study the utilization of Natural admixture Eggs is preferred since it can enhance the mechanical properties of mortar

2. Materials

2.1. Cement

Throughout the course of the study the Ordinary Portland Cement of grade 53 was used. With the help of the tests conforming to Indian Standard IS : 1489-1991 the physical properties

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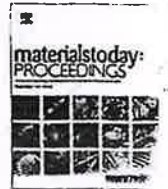
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Experimental investigation on strength and properties of natural fibre reinforced cement mortar

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ABSTRACT

Mortar is the binding material used to bind the masonry of a structure. Mortar is paste made of sand, cement, lime and water. Scientists are involved in finding new alternatives to reduce the cracks that can be used effectively in mortar and also make a use of recycled materials in construction to achieve sustainability in a safe way. In this study, it has been attempted to conduct experiments by using the natural fibres to building materials in order to evaluate the use of the natural fibres in construction sector. Six types of natural fibres such as Cotton, Wool, Silk, Linen, Nylon, Polyester, were used as an additive in 1%, 2%, 3%, by mortar volume and casted and cured for 7 and 28 days. Their role in cement mortar is analysed by evaluating mechanical, physical and durability properties. Finally the above test results were compared with normal mix mortars.

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1. Introduction

Mortar is an important element of ancient construction which has its footsteps throughout the evolution of human civilization. The archaeological evidences proves that the earliest known man-made structures which are even existing at the present are made by mortars which stands as an evidence for their strength. Many old structures made of mud and clay were reinforced with natural fibres, which shows the use of natural fibres is a prominent reinforcement to enhance the mechanical properties and structural behaviour. The coconut fibre, palm fibre and bamboo fibre are well known fibres used in natural fibre recycling for which there are several studies also to support their contribution. The aspect ratio can be defined as the ratio of fibre length to diameter of the fibre which can be given as L/D , mostly the aspect ratio lies between 30 and 150 for length of 6–75 mm. Fotint Kesikidou, Maria Stefanidou et al (2019), In this experiment, the coconut fibre, jute fibre and kelp fibre is used as reinforcement in mortar volume of 1.5%. The physical, micro structural and mechanical properties were

tested for both the cement and lime mortar. The cubes were casted and tested for compressive strength by 28 days. The best result were observed in 28% addition of kelp fibre which is followed by 24% addition of coconut fibre, the least performance is observed in 16% addition of jute fibre. Overall the natural fibres enhances strength more in lime mortar than cement mortar. It is obvious that natural fibre reinforcement enhances the strength and durability and also counters the social and economic issues. The basic properties such as flexural can be promoted in mortar without affecting the economic and environmental factors [1]. Leonidas Alexandos et al (2018), In this paper the author deals with the properties of textile reinforced cement mortar and gives an idea about the experiments and results of textile reinforced mortar with the supporting evidences and suggestions to face the durability issues. The textile reinforced mortar is a mixture of textile fibres and cement mortar, the fibres can be from organic and inorganic traces. This paper also discusses the shear and flexural properties of the textile fibre reinforced walls and some structural elements such as masonry arches were also analysed [2]. Mohammad S. Islam et al (2018), In this investigation the jute fibre is taken in the length of 10 mm and 20 mm and four volumes of 0%, 0.25%, 0.5%, 1% were taken for both. The cube cylinder and beam was tested for 28 days and the cube is tested for 7 and 90 days additionally and cylinder is tested for 90 days additionally. To the

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Experimental study on mortar as partial replacement using sawdust powder and GGBS

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ABSTRACT

Increasing demand and depletion of natural resources in construction world, so we need for the replacement of conventional mix. In this project main objectives is the sawdust powder 5%,10%,15% partially replaced by fine aggregate and the cement mortar consists of ordinary Portland cement with 10%,20%,30% partially replacement by ground granulated blast-furnace slag. Then add superplasticizer water reducing admixture very high workability and strength. Use of sawdust powder in mortar permit disposal of waste (saw dust), reduce the weight of the concrete. Good thermal insulation, efficient energy and low cost of material. The experimentation will be performed for 1:4 cement mortar 0.45% water cement ratio at various temperatures 50°C, 100°C. Result was expected to be used low carbon materials and eco-friendly solution to wood waste recycling for the construction industry.

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1. Introduction

Mortar is a combination of cement, fine aggregates and water, which are mixed in a particular proportion to get a particular strength. The mortar mix design is to achieve maximum durability and compressive strength as possible as without any compromise with the quality. Ordinary Portland cement is one of the most popular materials in construction world and demand is increased due to the rapid development of infrastructure construction. Reuse of waste or by-products shows great potential and developed as one of the main directions of low carbon materials. Now a day's ecologists are facing a big problem of disposing waste substance produced due to the cyclic production of wastes from various industries and agriculture. The new techniques and materials should be developed to construction world. River sand has been the most popular choice for the fine aggregate components of concrete in the construction. The over use of river sand has led to environmental concerns. The several research persons are working on the use of alternative materials in place of normal traditional materials to bring down the expenditure to be spent on building mate-

rials by using materials which is available in surrounding in construction works. It reduces the cost of concrete production and will reduce the cost of building construction. The replacement of fine aggregate (sand) with certain wooden powder in mortar that makes the structure light weight in construction. LW materials used to make a precast construction like floors, walls and other plastering works. A number of advantages of partially replacement sawdust mortar over other conventional mortar. Including better insulation properties, fire performance and strength properties. It can reduce materials cost, reuse wood waste and has similar thermal performance and improved strength. Wood-crete is a new material made from sawdust or other wood wastes with consideration for locally cheapest materials, reduces the construction cost for sustainable development and addition of NaOH was able to extract soluble content of sawdust. Raw materials are treated with NaOH at various percentage [1], the technical and economic interests better thermal insulation, energy saving and low cost of materials [2], the properties studied show that the polymers are compatible with sawdust then solid waste recycling for construction work after treated, many types wood particles collected in sawmills wood in country [3], Experimental study with partial replacement cement by GGBS in various percentage 0%,5%,10%,15% and 20%. It is increasing the strength of concrete [4], The sawdust concrete wall has better thermal resistance than

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Experimental study of an eco-friendly concrete by inbuilt with treated crumb rubber

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ABSTRACT

An Eco-friendly concrete is one of the essential concretes for this current environment. Increasing of automobile industry leads to produce a huge amount of waste tyres in the entire world. The disposal of waste tires continues to pose a serious threat to environmental protection and health. The main aims of this study are the utilization of Crumb rubber material as partial replacement for sand in M30 concrete mix at various percentages to produce an eco-friendly concrete. It has the extra benefit of saving in natural sand. In this study, a surface treatment process was proposed to make solid polarity groups to rubber surface to generate a solid chemical strength among the rubber and the concrete matrix. It is an effective process to enhance the mechanical properties of concrete.

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1. Introduction

Indian automobile industry is one of the largest in the world. The utilisation of vehicle in conveyance is also increasing day by day, therefore the use of tyres for the vehicles increased. In most of the parts of the world the use of vehicle tyre as crumb rubber is very less, so very often they are normally burn or just buried in landfills which are harmful to environment and causes Global Warming too. Crumb rubber which means small piece or the powdered form of tire (used in vehicle) which is being made after removing thin steel wire from the tire. The Scope of this study is to reduce the waste tyre rubber in the environment and utilised in the concrete at various percentage replacement of natural sand to gain better engineering properties of concrete. This has the extra benefit of saving in natural sand which are becoming lack in availability. The Utilization of crumb rubber from waste tyres could benefit the environment and construction industry. The main aims of this study are the using the treated Crumb rubber material in the Concrete as well as investigate the strength properties. In this research, we take M30 grade concrete. Then these cubes were cured in normal water for 28 days. Treated Crumb rubber were mixed in varying proportion of 0%, 2.5%, 5%, 7.5%, 10%. For strength

parameter compressive strength are found as per IS 516-1977, tensile strength is found as per IS 5816:1999, flexural strength is found as per ASTM C 78, permeability test and water absorption test for concrete are found. The Values obtained are studied with respect to controlled specimen.

2. Literature review

Mustafa Maher et al. [1] they investigated that the effects of partial replacements of sand by waste fine rubber on the long-term performance of concrete under low impact mid-point bending loading. Specimens were prepared for 5% and 10% replacements by volume of sand. The output appeared that the average compressive stress of the plain concrete in 28 days is 37 MPa. As the sand is replaced by fine crumb rubber, the compressive stress reduces by 14 and 22% with 5 and 10% of volumes respectively. The variation of tip load with time in which the peak amplitude of the tip load increase by 5 and 7% with replacements of 5 and 10% of sand volume by fine crumb rubber. The increases in tip load and bending load are attributed to the high plastic energy capacity of rubber which when added to the concrete, improves the mix ductility and the ability to absorb the impact load.

Kunal Bisht, Ramana (2017) [2] in the investigation they evaluated Mechanical properties and Durability properties for the various proportion 0, 4, 4.5, 5 and 5.5 percentages of crumb rubber of concrete. It has been observed that with an increment of crumb

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Effect of micro silica and ground granulated blast furnace slag on performance of rubberized mortar

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ABSTRACT

Mortar is a cement based paste widely used for constructing masonry structures. It is made by mixing cement and fine aggregate with adequate water cement ratio. Mortar is evenly applied on the wall structures to give a smooth surface finish and it also serves as a joint when applied between bricks. In the present world, Construction industry is facing much difficulty in collecting river sand as there are lot of restrictions imposed by the Government. Recent studies revealed that the waste rubber tire powder can be used instead of river sand. It is also well known fact that the cement manufacture industry causes environmental pollution and so it is better to use alternative eco-friendly material for cement. Micro silica (MS) and ground granulated blast furnace slag (GGBS) are industrial discarded goods and can be utilized as cement alternatives. In this study, Rubberized mortar is prepared by replacing sand with chemically treated rubber tire powder at 5%, 10%, 15% and 20% replacement levels and also replacing cement by MS and GGBS collectively. MS is replaced at 10% and 20% for cement whereas GGBS is replaced constantly at 10% for cement. The study analyses the performance of the rubberized mortar with combined effects of GGBS as well as MS and finally the ideal replacement level of each material is determined. It is found that 10% rubber tire powder for sand, 20% of MS and 10% of GGBS collectively for cement give better performance than other replacement levels.

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1. Introduction

As long as there is functioning of Automobile industry in the country, there will be production of tires. Tires are produced in large scales globally due to recent boom in the automobile industry. Tires became worn out when they finished their designed life. The waste tires are then collected and have to be disposed safely. These type solid wastes are generally incinerated or landfilled. Landfill method degrades the naturally enriched soil quality and depletes it. On the other hand, Incineration technique involves high temperature burning of tires which leads to environmental

pollution due to liberations of hazardous gases into atmosphere. Therefore both these methods are not eco-friendly and unadoptable. So we are in the necessity to find an effective method of disposing waste tires without causing damage to the natural resources and environment. Many studies suggested the idea of using waste tire rubber in powdered form as an alternative material for river sand in the construction field. In the study done by Ahmed A. Ghani et al., durability properties of mortar are enhanced by adding rubber fiber powder. Mortar blends using up to 20% rubber fiber powder indicated better-quality oxidation resistance [1]. "Kaveh Afshinnia and Amir Poursaee clarified that rubber particles acts as an energy absorbers during the Alkali-Silicate reaction (ASR) in mortar and also declines the ASR enlargement" [2]. "Oikonomou and Mavridou observed that there is improvement in chloride ion resistance in mortar but the strength characteristics of mortar has to be compensated. They studied modified mortar with tire granules as a replacement for the sand" [3]. "The Tire rubber

Abbreviations: RTP, Rubber Tire Powder; GGBS, Ground Granulated Blast Furnace Slag; MS, Micro Silica.

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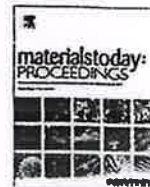
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Experimental investigation of concrete incorporating HDPE plastic waste and metakaolin

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ABSTRACT

This paper deals with the investigation of using Metakaolin and HDPE plastic waste with various percentages in concrete to make the concrete economical with desired properties and to reduce the consumption of naturally available construction materials. Six percentages of High Density Polyethylene (HDPE) Plastic powder (5%, 10%, 15%, 20%, 25% and 30%) and 10% metakaolin are incorporated with the weight of fine aggregate and cement respectively. The concrete with 10% metakaolin and 15% HDPE plastic powder gives better result on compressive strength in comparison with conventional concrete. The flexural strength and split tensile strength of concrete shows up to 80% and 90% replacement with 10% metakaolin and 5% HDPE plastic powder respectively.

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1. Introduction

Due to the utilization of river sand in a large amount, there is a demand for fine aggregate in making concrete. Hence, plastic waste is used as an alternative material which is discarded in landfill and causing environmental issues. The use of waste plastics in concrete enhances the mechanical properties of concrete and is a good water resisting material. To get the better result the HDPE plastic wastes are pulverized to a fine powder and are partially replaced with various percentages (5%, 10%, 15%, 20%, 25% and 30%) to the fine aggregate. During cement production a large amount of CO₂ is emitted which affects the environment majorly; hence cement is partially replaced with metakaolin in order to reduce CO₂ emission and also to improve the strength of concrete. The properties of each material in this study are investigated to find out the better result and the values obtained in testing hardened concrete are compared with controlled specimens.

Various studies showed that the employment of plastic waste in concrete as a partial replacement of fine aggregate gives better results. Awham Mohammed Hameed and Bilal Abdul-Fatah Ahmed explained that the mechanical properties of concrete at 1% PET content shows better result. The concrete density decreases with

incorporation of plastic content [1]. Rajat Saxena et al., described that the compressive strength of concrete decreases when plastic PET aggregate is incorporated to it [2]. Azad A. Mohammed, Ilham I. Mohammed and Shuaib A. Mohammed explained that the fine or coarse aggregate is replaced upto 30% of PVC aggregate in order to get desired properties [3]. Alireza Mohammadinia et al., in their study explained the employment of RPW and RCG in concrete in which coarse aggregate is replaced up to 20% by volume for RPW and up to 30% by volume for RCG which is used in the construction of footpath [4]. Thorneycroft, J., et al., explained that by replacing 10% sand with volume of recycled plastic is a feasible solution to save up to 820 million tons of sand every year [5]. Ankur Bhogayata C and Narendra K. Arora in their study explained that the addition of Metalized plastic waste (MPW) into the controlled concrete can reduced the environmental hazards and also enhanced the mechanical and durability property of concrete [6]. Rakesh Muduli and Bibhuti Bhusan Mukharjee investigates about the incorporation of metakaolin with varying percentages of recycled coarse aggregates (RCA) in concrete to improve its properties. The results shows that the concrete mix incorporating 100% RCA and 15% metakaolin having similar properties in comparison with controlled concrete [7]. Hence, in this study in order to increase the mechanical and durability properties of concrete the fine aggregate is replaced partially with HDPE plastic waste and cement by metakaolin.

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SUSTAINABLE CHARACTERISTICS OF FLY ASH BASED GEOPOLYMER CONCRETE INCORPORATING ALCCOFINE, ZEOLITE AND RUBBER FIBERS

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Development of sustainable and energy efficient construction material has been the viewpoint of research efforts worldwide in recent years. Although the use of Portland cement is unavoidable, many efforts are being made to minimize the use of Portland cement in concrete to a greater extent in infrastructure applications. It is time to utilize new technology materials like geopolymers that offer waste utilization and emissions reduction with enormous ability. An alternate binding material to the OPC has been found out known as geopolymer concrete (GPC). In this study, GPC will be made of fly ash incorporating alccofine in various percentages of 5%, 10%, 15% and 20% as partial replacement to fly ash. Zeolite was partially added to fine aggregate at 10%, 20%, 30% and 40%. Rubber fibers were added at 2% by the weight of binder. Alkaline activator for geopolymerisation was prepared by mixing Sodium hydroxide solution at 10M with Sodium silicate solutions are used. Control mix is casted for M30 grade concrete. The samples are proposed to be cured by hot-curing for 24 hours thus mechanical and durability properties were examined. Addition of zeolite at 30% and alccofine at 15% is found to be an optimal content in geopolymer content and when the concentration of zeolite in geopolymer concrete is increased the slump value decreases. The rubber fiber contents kept constant at 2%, only lesser voids are generated due to improper bonding between rubber fiber particles, which does not contribute more in compressive strength. Geopolymer presents denser microstructure, lower total pore volume and optimized pore structure compared to OPC paste and therefore geopolymer concrete is much more durable in an aggressive environment.

Keywords: Geopolymer concrete, fly ash, alccofine, zeolite, rubber fibers.

1. Introduction

Cement industry accounts considerable share for CO₂ emission due to high environmental carbon footprint of cement which cause global warming and other worst effects. Therefore it is important to take necessary measures to reduce carbon footprints. It can be overcome through economic mix design and by using alternate binding materials for concrete such as bacterial concrete or geopolymer concrete [1,2]. It is time to benefit new technology materials like geopolymers that offer waste utilization such as industrial byproducts and emissions reduction. GPC have high strength, with good resistance to durability characteristics. The approaches of GPC are commonly formed by alkali activation of industrial alumino silicate waste materials such as Fly ash, GGBS, metakaolin, rice husk ash etc., and have a very small Greenhouse footprint when compared to conventional concretes. The exploitation of river sand endangers the stability of river banks and creates environmental problems. Hence the use of alternative materials for river sand, such as manufactured sand, industrial by products, and recycled aggregates. Among these, the use of manufactured sand is gaining high potential. The shape and texture of M-sand lead to improved strength due to better interlocking between the particles [2-4]. Two main constituents of geopolymer ingredients are source materials and alkaline liquids and such source materials involves the production of binders from alumina and silica rich industrial

byproducts such as fly ash, GGBS, rice husk ash, etc. and therefore, this can also be termed as sustainable geopolymer concrete [5]. Due to the chemical composition, natural zeolites are among the possible raw materials for the production of geopolymers. Zeolites are crystalline hydrated alumino-silicates, composed of silicon and aluminium tetrahedra (SiO₄ and AlO₄) and linked by one oxygen atom [6]. These source materials react with alkali-activating solutions such as sodium or potassium hydroxide with sodium silicate and form cross-linked three-dimensional alumino-silicate network consisting of Si-O-Al-O bonds [7-16]. Rubber fibers enhance impact resistance but reduces compressive strength [13]. The mechanism for the geopolymerisation process activation involves three major reactions (a) Dissolution of Si and Al atoms from the source material through the action of hydroxide ions (b) Orientation or condensation of precursor ions into monomers (c) Setting or polycondensation or polymerization of monomers into polymeric structures. Alccofine has higher fineness, so acts as a micro filler and is rich in alumina content which have enhanced the hydration, geopolymerisation process and early setting properties [17-24]. Alkaline solutions play a major role in geopolymerization at the early stage as it dissolves the active aluminosilicate species in the reaction [25-28]. Burning rubber creates toxic smell and emissions of lethal gases with restrictions of law in some of the countries [27]. Heat treatment is necessary to achieve desired strength adds to the

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Prosopis juliflora fibre reinforced green building plaster materials – An eco-friendly weed control technique by effective utilization



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ABSTRACT

The use of eco-friendly materials are now becoming the field of interest in construction industry to ensure sustainability and healthy living. Gypsum plasters are eco-friendly building materials but are brittle in nature and hence reinforcement of these plasters using fibres has been found to be beneficial at its post tensioning stage. In this present work the control of harmful ecological impact of Prosopis juliflora invasive species by their effective utilization in building plaster is proposed. To assess the performance of this environmental friendly building plaster using Prosopis juliflora fibres the physical properties such as setting time, temperature rise and density were measured. Furthermore the Prosopis juliflora fibres were subjected to various chemical treatments (NaOH, K₂MnO₄ and distilled water) and the effect of these treatments on the interaction of fibre with gypsum plaster was evaluated in terms of mechanical strength characterization. Based on the observed results the enhancement in flexural strength of the plaster was observed coupled with the transformation of brittle failure to ductile failure. The toughness of the composites were also much enhanced with the addition of the fibres.

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1. Introduction

The use of gypsum plasters has become widespread due to the negative impacts caused due to cement production (Alena et al., 2011). In order to reduce the usage of cement the alternatives for cement and concrete products in construction industry are now being actively searched for (Sakthieswaran et al., 2016). Gypsum plasters are good in compression with high compression strength but like inorganic cements they lack flexural strength (Aakanksha et al., 2015; Adnan, 2001). Hence the incorporation of fibres as reinforcement of gypsum plaster becomes mandatory for the efficient utilization of gypsum for structural works (Bijen and Vander Plas, 1992). The synthetic fibres are now being replaced by natural fibres due to the non-renewable nature and non bio-degradable nature of synthetic fibres (Pierre et al., 2010).

Several research works have been performed by using glass fibres and other synthetic fibres as reinforcement for gypsum plaster (Amina et al., 2014; Nelson and Mar Barbero-Barrera, 2017; Vidya Tilak et al., 2015; Martias et al., 2014; Osman et al., 2014; Lushnikova and Dvorkin, 2015; Linlin and Guozhong, 2014; Wail et al., 2016; Hlubocký Lukas et al., 2015). Attempts have also been done to improve the plaster behaviour by the addition of natural fibres. For the past few

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EFFECT OF FLY ASH AND METAKAOLIN ON THE STRENGTH AND STABILITY CHARACTERISTICS OF SELF COMPACTING CONCRETE

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This research examined the workability, mechanical properties and durability properties of self-compacting concrete (SCC) with fly ash and glass fibers. Glass fiber was added to the concrete at a rate of 0.25% by the weight of binder, fly ash and metakaolin was replaced at the rate of 5%, 10%, 15%, 20%, 25% and 30% respectively to the cement. The workability of fresh concrete samples was assessed using slump flow, slump flow T50 and J-ring. The overall strength of hardened concrete was investigated by using compressive, tensile strength and flexural strength tests for a fixed water/binder ratio of 0.35 with grade of M30 at 28, 56 and 180 days. The mechanical properties of SCC show an enhanced performance compared to the control mix and satisfy the fresh concrete properties such as filling ability and passing ability. SCC shows better resistance to the external environment. Thus, it shows a successful use of waste products in the SCC leads to the sustainable nature.

Keywords: Self-compacting concrete, fly ash, metakaolin, glass fibers

1. Introduction

The properties of self compacting concrete (SCC) render good materials for use in structures with complicated and narrow sections and reduce the labor for casting concrete. Fibers with very small diameters have a high surface area, which increases their distribution in the concrete matrix and negatively affects the workability of SCC they influence the properties of fresh and hardened SCC [1]. SCC can be placed under its own weight without any mechanical compaction and improve high workability, passing ability and high deformability [2-4]. With the increasing pressure on the construction industry to reduce and optimize energy and cement consumption, the use of supplementary cementitious materials (SCMs) is a possible solution to reduce the global CO₂ emissions due to cement production [5]. SCC has the advantages of workability improvement, reduction in water demand, less segregation, reduced heat of hydration, increased long term strength, significant reduction of permeability and chloride resistance, reduced expansion due to alkali-silica reaction and increased sulfate resistance [6]. Fibers have the property of substituting a single large crack with a dense network of micro-cracks, and subsequently bridging the micro-cracks within the cement matrix and would transfer the induced tensile stresses from the cement matrix to the fibers, rendering ductile post-cracking behavior [7]. Resistance to segregation during casting is another reason for using SCC. This property makes concrete homogeneous during transport and pouring [8].

Filling ability is described as the concrete's ability to completely fill the desired space under its own weight. Passing ability is the concrete's ability to flow freely in small spaces around steel, reinforcement bars without clogging up or segregating, and segregation resistance is its capability to remain in a consistent state during transportation as well as before and after placement [9-11]. The main purpose of using SCC is to reduce the period of construction, to assure compaction in confined zones of structure where it was difficult to vibrate and to avoid noise caused during vibration [12]. The use of SCC has become popular during recent years due to the noise reduction during the construction phase and avoiding vibration [13, 14]. It is necessary to consider benefits such as waste incorporation to concrete, gains in durability provided by the high volume of mineral additions utilized, and in particular, the use of Portland cement in smaller proportions than those currently used [15]. The use of mineral additives such as slag, fly ash and silica fumes has been the subject of numerous investigations in all areas of self-incorporating concrete [16]. SCC has been portrayed as the most dynamic improvement in strong advancement for a drawn-out period of time [17]. SCC can be put and alter at any place by its self-weight. SCC is a staggeringly fluid mix it has incredible detachment, high deformability and has the low yield weight [18-23]. The use of waste materials in concrete has a benefit from the environmental point of view as the CO₂ emissions are reduced [24]. This helps to find one of the most environmentally and technically appropriate solutions for the disposal and recycling of industrial waste.

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MUTUAL EFFECT OF COAL BOTTOM ASH AND RECYCLED FINES ON REACTIVE POWDER CONCRETE

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Reactive Powder Concrete (RPC) is one of the advancements in concrete well known for its dense, compact structure and its superior performance at elevated temperatures. The momentous fact behind the dense matrix of Reactive powder concrete is exclusion of coarse aggregates, inclusion of fine materials possessing pozzolanic properties, steel fibers and super-plasticizers at proper proportions. The main objective of this research is to investigate the performance of RPC produced by partial replacement of cement by alccofine and quartz sand by coal bottom ash (CBA) and Recycled Aggregate Fines (RAF). CBA and RAF used were crushed and grinded to attain the particle size to effectively fill the voids and to reduce the porosity. The experimental investigation to determine the mechanical properties such as compressive strength, split-tensile strength and flexural strength and durability characteristics such as water absorption, sorptivity and acid attack tests were performed. The results showed that the fineness and particle size range of the CBA and RAF increase the potential to develop ultra-high strength in Reactive Powder Concrete. The RPC composed of 10% of CBA and 10% of RAF as partial replacement of Quartz Sand performed well in all mechanical strength characteristics and also within permissible limits in durability terms. The replacement of 40% Quartz sand by equal proportions of CBA and RAF proved to be satisfactory compared with that of control RPC specimens.

Keywords: Reactive Powder Concrete, Coal Bottom Ash, Recycled Aggregate Fines, Hot water curing, Mechanical strength and Durability characteristics

1. Introduction

Reactive Powder Concrete is an advanced invention of Ultra High Strength Concrete (UHSC) in construction materials. The main factors contributed to the prosperity of the Reactive Powder Concrete are low water-binder ratio, exclusion of coarse aggregates, inclusion of pozzolanic and silica rich fine materials such as ordinary portland cement, silica fume, quartz sand and micro-steel fibers. Several researchers have applied the aforementioned principles and studied the various strength and micro-structural properties of Reactive Powder Concrete (RPC). The performance of RPC is better at elevated temperatures and hence applied for special structures exposed to heat and high temperatures. Furthermore researches on the feasibility of the alternative materials for the binder and also the fine aggregates in concrete in order to obtain a desirable and sustainable construction material is increasing day by day. However the acceptance of the materials for real applications in concrete structures relies on the satisfactory economy and efficiency of the materials.

Evolution of mineral admixtures for replacing cement becomes imperative to overcome the emerging global warming issues associated with CO₂ emission on excess consumption of cement in construction material [1]. Alccofine is one of the supplementary cementitious materials obtained as ultra fine form of slag as by-product from steel

industry [2]. The economy and efficiency of alccofine received the attention of researchers and its extensive properties in concretes like geopolymer concrete was investigated [3, 4]. Incorporation of alccofine enhanced the polymerization followed by the compactness of the structure in geopolymer concrete [4]. However the research works on alccofine are limited. On the other hand, waste generation and disposal possess the major challenge for researchers to find an effective formula to get rid of the vulnerability of environmental hazards. The main two indispensable reasons for the waste generation around the world are waste by-products from the manufacturing units and one-time usage of materials. Many ventures to manage the waste generation problems are made by the researchers mainly involving recycling and reapplying the waste by-products in construction material which is always necessitated. Coal bottom ash (CBA) is one of the industrial by-products obtained from thermal power plants. Studies on incorporation of CBA in concrete as the partial replacing material for cement [1] and sand [5] were made and proved to be optimum on 50% replacement of fine aggregate [6]. The porous structure of CBA increases the inter-particle friction which decreases the workability [7]. However the pores of CBA projects itself as a lightweight aggregate and are capable to store the amount of water required for internal curing and have the potential to release the absorbed water for

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Optimization of Friction Welding Parameters in Dissimilar Materials using Taguchi's Method

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Abstract

At present there are various welding process is introduced among them there is Friction welding (FW) is a fairly recent technique that utilizes a non on sumable welding tool to generate frictional heat and plastic deformation at the welding location, There by affecting the formation of a joint while the material is in solid state. The technique can produce joints utilizing equipment based on traditional machine tool technologies. the main aim of this paper to obtained friction weld element of dissimilar material and optimizing the friction welding parameters in order tom establish the weld quality. Taguchi method is applied for optimizing the welding parameters to attain maximum tensile strength of the joint and hardness of the welded joint. It is widely used in aerospace and automotive industrial applications. The process parameters play a major role in determining the high tensile strength of the weld of dissimilar materials.1.Rotational speed, 2.Friction pressure, 3.Friction time, 4.Forge pressure.

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Modelling of Rotary EDM Process Parameters of Inconel 718 using Artificial Neural Networks

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1. Introduction

Nowadays the researchers utilize Artificial Neural Networks (ANN) for demonstrating complex modern industrial issues. ANN is a great alternative to traditional experiential modelling primarily based on polynomial and linear regressions [1]. Utilizing ANNs would prompt sparing time and cost by conceiving the experiential results [2]. Recently, ANNs have become a predominant method in the modelling of manufacturing-related complex issues because of their capacity to learn and to generalize (interpolate) the unpredictable relations among input and output parameters [3]. ANN avoids the limitations of the conventional methods by extracting the desired information using the input data [4-5]. Furthermore, ANN's have model-free estimators, i.e. they can model complex input-output association without using any scientific model [6].

ANN was configured with different layers, and thus named as multilayer ANNs. Multilayer Perceptron (MLP) Neural Networks comprises an input, hidden and output layers. The best possible number of neurons within the in the hidden layer was identified by a series of network configurations, during which the number of neurons varied from 1 to 30. The Root Means Square Error (RMSE) was considered as the error function. Generally, a technique of trial and error was used to define the number of neurons (nodes) within the hidden layer. Many endeavors are taken to research network performance by varying the number of hidden nodes. Therefore, different candidate networks were configured, each was trained independently, and therefore the best network was chosen in keeping with the accuracy of the estimates within the testing phase. It should be noted that if the number of hidden nodes is excessively huge, the ANN could be over-trained to offer false values within the testing phase. If too few nodes are selected, the proper relation might not be achieved due to the training of the neurons. The data acquired from the experiments were applied to train the network. The scaled data were passed into the input layer and then they were disseminated from the input layer to the output layer through hidden layers. Every node in a hidden or output layer was served as a summing point to combine and modify the inputs from the preceding layer. The training is the process by which the measures and biases are adjusted efficiently so that the network shows some anticipated performance. To achieve a supervised training, ANN output error might be evaluated.

As modelling of a process decreases the effort, cost and time for optimal and efficient application of that process, it has a noteworthy role in the Electrical Dis-

charge Machining (EDM) process modelling also. Several researchers have been carried out in this direction using ANN modelling, but still, they need more enhancements. So to find the direction of enhancement, a literature review has been carried out as follows: Juhr et al. [7] compared the experimental results of a nonlinear regression model and the ANN model for the generation of continuous parameter technology. It was found that the ANN exhibits improved prediction accuracy than the proposed regression model. Panda & Bhoi [8] formulated an ANN model using the Levenberg-Marquardt learning algorithm and logistic sigmoid transfer function to estimate the Material Removal Rate (MRR). It was reported that a Feed Forward Neural Networks (FFNN) model with a 3-7-1 network configuration delivers quicker and more accurate results. Markopoulos et al. [9] applied an ANN model for the prediction of Surface Roughness (SR) using Matlab® and Netlab®. It was reported that both simulators were found effective for the calculation of SR. Joshi & Pande [10] proposed two models using the Finite Element Method (FEM) and ANN for the advanced machining process. An optimal ANN model with the network configuration of 4-8-12-4 was achieved to provide very good prediction accuracies for MRR, crater depth and crater radius and a reasonable one for Tool Wear Rate (TWR). Thillaivannan et al. [11] created an ANN model to optimize the input factors with the minimum machining time using the Taguchi technique. Feed Forward Back Propagation Networks (FFBPN) with two Back Propagation (BP) algorithms, namely Gradient descent and gradient descent with momentum, were used for finding a correlation between the target performance measure and input factors. Fenggou & Dayong [12] proposed an ANN modelling technique to find the number of hidden nodes and optimize the correlation between input variables and performance measures using Genetic Algorithm (GA) and Back Propagation Learning Algorithm (BPLA). It was reported that 8 hidden nodes were observed to be ideal for a required dimensional accuracy and performance. Khan et al. [13] developed an ANN model with MLP neural architecture to predict the value of SR on Ti-15-3 alloy. An average of 6.15% error was observed between required and predicted values of SR which found to be in good tradeoff with the test results. Panda [14] developed a novel hybrid method of the Neuro-Grey Modeling (NGM) method. This system has been examined for the optimization of multiple parameters (e.g. SR, Micro-Hardness (MH), the thickness of the recast layer and MRR) of the process. In this approach, R-square and Means Square Error (MSE) are used to evaluate the efficiency of ANNs.

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Dynamically Changing Parameters Particle Swarm Optimization (DCPPSO) Based Trajectory Planning of 3-Links Articulated Robot



S. Ramabalan, S. Mahalakshmi, and M. Chinnadurai

Abstract Time and Energy trajectory planning is an agile research topic among researchers in the field of robotics. This paper introduces a novel method for time-energy trajectory generation. Trajectory optimization is a vital problem in motion planning. The convexity and difficulties of the problem are increased by the practical constraints due to geometrical parameters, destination configurations, kinematic characteristics, and dynamic parameters of the robot. The proposed algorithm solved a convex optimal problem. The problem has two performance criteria, 13 constraints, and seven variables. A new variant of particle swarm optimization namely Dynamically Changing Parameters Particle Swarm Optimization (DCPPSO) is introduced. It prepared an optimal trajectory for a three RRR articulated robot. The results were contrasted with literature results.

Keywords DCPPSO · RRR articulated robot · Trajectory optimization

1 Introduction

The motion planning problem dictates how to displace a robot arm from a configuration or location to another configuration or location. During movement, the robot arm must be safe, i.e., without getting any accident [1]. The accident is due to hitting anything. It is termed as collision avoidance or obstacle avoidance. Collision avoidance is avoiding a collision between the robot and other devices or robots. Avoiding the obstacle from the path during motion is termed as obstacle avoidance. The complexity of motion planning is increased by optimality conditions, modeling errors, and differential constraints. In real-life situation, to reduce algorithm running time, a near optimal result is used as starting solution [2]. Motion planning is a tedious

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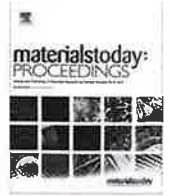
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Chatter control and stability analysis in cantilever boring bar using FEA methods

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ABSTRACT

Chatter is a self-excited vibration that occurs during any machining process. Chatter sensations were stir up during boring process due to cantilever shape of boring bars. These vibrations amplify the temperature of the boring tool additional which ultimately increases the tool wear. In this project a proper damping material is fixed on the boring bar, used to measure temperature for various positioning of the damper, different levels of speed, feed rate and depth of cut in the machining test. The main intention of the work is to design damped tool holder for existing machine tools with low cost. The enhancement of the damping ability of boring tool and control the chatter were attempted using different types of dampers such as Copper and Brass. These materials comprise high density and so that inertia mass of the boring tool is improved to suppress the chatter of boring operations. Modal analysis of boring bar is done by using ANSYS software in this current investigation. Modal examination is used to determine the natural frequencies and mode shapes of a structure. The natural frequencies and mode shapes are incredibly important factor in the design of a structure for vibrant loading conditions.

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1. Introduction

In manufacturing sector, the internal turning or boring operation is a common metal working process that is usually associated with vibration problems. The boring tool is one of the primarily used tools in metal cutting process. In such process, a boring tool is used to machining deep drilled-hole specific geometries to required tolerances inside a pre-drilled hole in a job piece. Vibration in boring process is typically inevitable; a boring tool can usually be characterized as a lean beam and is usually the weakest linkage in a machine tool structure. Elevated stages of boring bar vibration result in poor surface finish, extreme tool wear, tool fracture and harsh levels of acoustic noise. Though machining, reason of vibrations is curvy plane is missing in the work piece surfaces and after single rotation the tool faces a curvy plane is missing there during the previous tool pass. This is the procedure of regeneration. Regenerative vibration was planned as a closed-loop communication between the structural, active and cutting process.

Vibration in metal cutting process, in common, is the end result of equally forced and self-excited vibrations. Forced vibration is due to the unbalance of rotating members, such as unbalanced driving arrangement, servo unsteadiness, or impacts from a multi pointed tooth cutter. Self-excited vibration is of two category, namely primary (non-regenerative type) and secondary (regenerative type) [1–4]. The non-regenerative kind of self-excited vibration arises when there is no contact between the vibratory movement of the arrangement and the undulation face formed in the uprising of the work piece, for example in threading. While the regenerative type of self-excited vibration is due to the contact of the cutting force and the work piece surface undulations produced by earlier tool passes.

The regenerative category of self-excited chatter is found to be the mainly damaging phenomena in for the most part machining process; hence it becomes the focus of this project work. The study in the field of chatter analysis in cutting process was started in late 1990s. This article related to the steadiness of the cutting arrangement with fluctuating cutter which is used to suppress vibration in a cutting process and also it enhances the stability of the cutting arrangement by suitably rising time changing scale and frequency of the fluctuating cutter [5–7].

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Investigation of Damping Characteristics on Copper-Based Shape Memory Alloy Frictional Damper in Boring Process

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Abstract

Chatter is a self-excited phenomenon in machining, especially in boring and end milling processes due to the slender nature. A passive approach of copper-based shape memory alloy frictional damping has been provided to suppress the tool chatter. Boring tools made of EN31 material have been chosen and damped with frictional dampers made of copper-based shape memory alloy such as naval brass, Muntz metal and leaded brass. Characterization study of shape memory alloys was performed using the X-ray analytical microscope, differential scanning calorimetry and impact hammer test for element confirmation, transition temperature and modal analysis, respectively. Machining performance of the proposed damping bars was investigated through logarithmic decrement, damping ratio and resonance gap of the machining system, as well as the displacement, temperature, tool wear and surface roughness in the boring process. The comparative study was reported between the damped and undamped boring bars. The comparative study revealed that better results were obtained from the boring bar damped with leaded brass. A 19.2%, 55%, 59.9% and 78.1% of reduction was witnessed in terms of temperature, displacement, surface roughness and tool wear of the boring bar damped with leaded brass compared with the unchanged boring tool holder.

Keywords Passive damper · Shape memory alloy · Frictional damping · Damping performance · Natural frequency

1 Introduction

The boring tool holder is subjected to chatter due to the regeneration. When chatter exceeds the threshold, the vibration is dissipated in the form of heat. The dissipation is due to the sliding friction between the boring bar cavity and damper rod to suppress the chatter. Two kinds of the method were available to analyze the friction, namely Coulomb (dry friction) and viscous (wet friction) models.

Coulomb model-based frictional characteristics are associated with frictional damper rods. Coulomb model is a regular mechanical model in which friction is produced by the relative movement of the two surfaces that press in opposition to each other, which converts the kinetic energy into heat energy. The friction force F applied among the moving surfaces is equivalent to the product of the normal force N and the coefficient of kinetic friction μ_k .

$$F_k = \mu_k N \quad (1)$$

In kinetic friction, the frictional energy always opposes the path of motion of the object. The normal force is upright to the object direction of motion and equivalent to the object sliding load. From the research point of view, frictional damper still needs careful attention because the vibratory energy is dissipated in the form of heat. Owing to the presence of heat, damper and tool interface may get worn out after a certain period. Even though this type of deterioration exists in friction damping, the use of shape memory alloys (SMA's) as a damper can overcome this drawback.

In this current investigation, the focus is given to utilize SMA as a damper in the frictional damping method, and

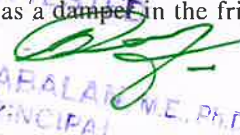
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Experimental investigation of electrode shape configuration in sustainable electric discharge machining process

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Abstract. Electric Discharge Machining (EDM) is also known as spark erosion process which is used to machine hard material and complex shape profile. In EDM process, dielectric fluid plays an important role for material removal as well as generates environmental and health related issues. In this work, an experimental effort is made to study the different categories of dielectric by varying shapes of electrodes during machining of die steel. In this work, an attempt of canola oil and jatropa oils used as dielectric fluid and the machining performance are analyzed with kerosene as dielectric fluid. Material Removal Rate (MRR), Tool Wear Rate (TWR) and Surface Roughness (SR) are selected as performance measures. The result observed that higher MRR with canola oil as dielectric compared to commercial dielectric fluid due to its good dielectric properties. Also, it is observed that higher TWR and SR which is required further investigation. Each shape of electrodes and their machining performance are compared with different dielectric fluids and the results indicated that canola oil provides good performance when compared with jatropa and kerosene. This natural and biodegradable dielectric fluid can be replaced for hydrocarbon oil based dielectric fluid.

1. Introduction

EDM is most generally utilized non-traditional process as it is best known for expelling material from the most intense to cut materials for getting them into proper shape and measured segments. The specialty of EDM process is its functional accuracy and meticulous in accomplishing high tolerances with most of the hard materials at elevated temperatures. The high frequency electric energy produces sparks due to the disintegration of dielectric fluid at the temperature levels up to 13000 K. This temperature will vaporize and soften the workpiece material into required shape and size of the part. Currently, EDM processes use hydrocarbon oil-based dielectric fluids, which generates harmful elements and it affects the environment and operator health [1-3].

Ng et al. [4] perfumed spark erosion process using natural vegetable oil based dielectric oil to achieve green environment. Two types of vegetable oils such as sunflower and canola oil were used. The result showed that removal of material was increased at all set of machining conditions. Sadagopan and Mouliprasanth [5] investigated that the effect of various dielectric oils (biodiesel, transformer oil and kerosene) in the EDM process of aluminium alloy. The result showed better machining performance with biodiesel as dielectric oil. Valaki et al. [6] targeted that green EDM process using jatropa oil based as dielectric oil. Machining performance using jatropa oil based dielectric fluid was better than conventional one. They have suggested that vegetable oil based dielectric could be replaceable for hydro carbon oil based dielectric fluid. Singaravel et al. [7] conducted machinability analysis in terms of surface finish during EDM process. Dielectric oil was used as



Investigation of powder mixed electrical discharge machining and process parameters optimization using Taguchi based overall evaluation criteria

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Abstract: Electrical Discharge Machining is a type of nontraditional process can be used for machining of hard materials and making of complicated shape. In EDM, the important parameters are tool, workpiece and dielectric liquid. Dielectric liquid is used to enhance ionization during the process. Powder Mixed EDM (PMEDM) is preferred for enhance the process efficiency. In this work, nano alumina (Al₂O₃) powder is added to the dielectric liquid and the process parameters effects are investigated. Input parameters considered are pulse on time, pulse off time and current. Output parameters considered are rate of material removal, surface quality and wear in electrode. Nano powders are mixed in the ratio of 2% to the EDM oil during the operation with dielectric fluid weight ratio. Process parameters are optimized using Taguchi based Overall Evaluation Criteria (OEC). The result revealed that PMEDM is enhanced the process efficiency.

1. Introduction

EDM is widely preferred nontraditional process which is considered to process hard materials and making intricate shapes. EDM process plays a significant function in manufacturing sector and marketing around the world [1, 2]. The process efficiency enhancement in EDM process is an important task. In this work, two methods are used to improve the efficiency of machining process. Powders are mixed in dielectric liquid [3] and process parameters optimizations [4] are the important methods.

Powder mixed EDM is approached for elimination of conventional drawbacks such as high electrode wear and poor surface quality. In this regard, micro or nano powders are added with appropriate proportion to the dielectric liquid. The important functions of PMEDM are lowering the dielectric breakdown properties, wide the spark gap, flushing uniformity and stable in spark [5-8]. Optimization of process parameters are used to enhance the efficiency in machining. Taguchi is a standard optimization tool for solving problems in science and engineering problems [9]. But, it has a limitation for dealing



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Energy bandgap studies on copper chalcogenide semiconductor nanostructures using cohesive energy

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Investigating the properties of semiconductor nanomaterials to understand the specific behavior of nano-scale materials and predicts novel advancement of functionalized semiconductor materials that are influenced by cohesive energy. Cohesive energy is strongly associated with semiconductor nanomaterials as the energy increment by the arrangement of atoms in a crystal which is one of the most fundamental properties. In this communication, the shape and size dependence over the energy bandgap of copper chalcogenide semiconductor nanomaterials is investigated. The theoretical model is derived on cohesive energy of semiconductor nanomaterials was equated with the bulk materials. For this research, we considered Cu_2SnS_3 , Cu_2SnSe_3 , Cu_2SnTe_3 , Cu_3SbSe_4 , and CuSbS_2 chalcogenide matters to the study of shape and size dependent-energy bandgap. The model forecasts that the energy bandgap is inversely proportional to the size of the semiconductor. The present modeling results are correlated with established experimental data and underpin the model reported.

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Keywords: Cohesive energy, Chalcogenides, Copper quantum dots, Energy bandgap

1. Introduction

In recent years, the idiosyncratic properties of semiconductor nanostructures have attracted high attention amongst researchers. The chemical and physical properties of semiconductor nanostructures fairly differ from those of bulk structures and significantly depend on size [1-4]. Semiconductor nanostructures have provided very interesting research related to optical and electronic device applications as well as to fundamental physical science. Recently Irshad et al. [5, 6] reported that electronic and optical properties of Cu_2SnS_3 and $\text{PbSe}_x\text{S}_{1-x}$ QDs ($0 \leq x \leq 1$) are determined by using Brus and Vegard's law. Notably, the surface-volume ratio of semiconductor nanocrystals is significant to analyze their properties. One of the significant properties of semiconductors is energy bandgap which plays a vital part in the optical and electronic properties of the semiconductor. Therefore it's important to study the energy bandgap variation of semiconductor nanostructures to understand the better opportunity.

Due to the wide energy bandgap, semiconductor nanostructures have extensive applications in solar cells and other optoelectronic devices. Bulk semiconductors such as silicon and germanium are limited in the optoelectronics applications due to small and indirect energy bandgap whereas silicon-based nano-photonics devices have been commercialized. Several kinds of literature reported on size-dependent energy bandgap of low dimensional structures have been reported. The size dependent's effect on energy bandgaps over one-dimensional nanostructures is


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A Competent Ad-hoc Sensor Routing Protocol for Energy Efficiency in Mobile Wireless Sensor Networks

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Abstract

In wireless sensor networks (WSNs), energy utilization plays an essential part in the survival time (survivability) of the network. All the network aspects are redesigned to work in the WSN for lesser energy consumption. In this regard, routing protocol and dynamic topology are very crucial aspects to be noted. In this work, we present a competent ad-hoc sensor routing (CAsER) protocol for delay reduction, reliable data communication, and efficient energy usage in mobile WSNs (MWSNs). It is aimed to cope up with challenging requirements of the rising limited battery powered technologies, which requires low energy consumption and end-to-end delay (EED). Further, the CAsER uses reservation based channel allocation using reservation time division multiple access mobility adaptive cross-layer in dynamic networks and cost based multi-hop communication for packet forwarding and gradient maintenance. The MWSN routing protocols, robust ad-hoc sensor routing, mobility adaptive cross-layer routing, and proactive highly ambulatory sensor routing as well as the mobile ad-hoc network protocols, optimized link state routing and ad-hoc on demand distance vector, measure up with the CAsER. The simulation results show improvements over other routing protocols in energy consumption, EED, queuing delay, and reliable data communication. The competence of this protocol makes it highly suitable to minimize time delay in target applications.

Keywords Routing · Wireless sensor network · Energy efficiency · Dynamic topology · Ad-hoc network

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Virtualized Load Balancer for Hybrid Cloud Using Genetic Algorithm

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Abstract: Load Balancing is an important factor handling resource during running and execution time in real time applications. Virtual machines are used for dynamically access and share the resources. As per current scenario cloud computing is played major for storage, resource accessing, resource pooling and internet based service offering. Usage of cloud computing services is dynamically increased such as online shopping, education, ticketing, etc. Many users can use the cloud resources and load balancing is used for adjusting the virtual machine and balance the node. Our proposed virtualized genetic algorithms are to provide balanced virtual machine services in Hybrid cloud. The proposed algorithm and experiments are implemented by using Cloud simulator. In this paper the experiments are done with cloud computing models, Virtual Machine allocation, load balancing and simulations. Also compare the results using response time, throughput and turnaround time using cloud sim. The accuracy can be compared with existing load balancing techniques.

Keywords: Load balancing; hybrid cloud; virtual machine; genetic algorithm; cloud simulator

1 Introduction

Cloud computing is a delivery service model based on requirements such as infrastructure, platform and software as services. Cloud is an internet storage model and provide plenty of services. Cloud computing application can access services from remote location data, sitting one place and access the resources from anywhere and any place. User retrieves the data from the storage and shares the resources [1]. Cloud service provider is an important for all cloud accessing. Cloud service provider enables the service offering, service level agreement and load balancing. Load Balancing is major issues for handling resources. At the same time multiple users can access the cloud means need to balance the service [2].

In general cloud computing has no need of physical location, configurations, required space and administration capabilities. The major features are virtualization, on demand service, pay for use, geographic access model, access privileges and service level agreements. It is internet based technology, provides dynamic reliable and efficient services [3]. On demand services is important key features because whenever the service is required that time request the service and pay for usage. Nowadays



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An IoT based Green Home Architecture for Green Score Calculation towards Smart Sustainable Cities

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Abstract

In the recent modernized world, utilization of natural resources (renewable & non-renewable) is increasing drastically due to the sophisticated life style of the people. The over-consumption of non-renewable resources causes pollution which leads to global warming. Consequently, government agencies have been taking several initiatives to control the over-consumption of non-renewable natural resources and encourage the production of renewable energy resources. In this regard, we introduce an IoT powered integrated framework called as green home architecture (GHA) for green score calculation based on the usage of natural resources for household purpose. Green score is a credit point (i.e.,10 pts) of a family which can be calculated once in a month based on the utilization of energy, production of renewable energy and pollution caused. The green score can be improved by reducing the consumption of energy, generation of renewable energy and preventing the pollution. The main objective of GHA is to monitor the day-to-day usage of resources and calculate the green score using the proposed green score algorithm. This algorithm gives positive credits for economic consumption of resources and production of renewable energy and also it gives negative credits for pollution caused. Here, we recommend a green score based tax calculation system which gives tax exemption based on the green score value. This direct beneficiary model will appreciate and encourage the citizens to consume fewer natural resources and prevent pollution. Rather than simply giving subsidy, this proposed system allows monitoring the subsidy scheme periodically and encourages the proper working system with tax exemption rewards. Also, our GHA will be used to monitor all the household appliances, vehicles, wind mills, electricity meter, water re-treatment plant, pollution level to read the consumption/production in appropriate units by using the suitable sensors. These values will be stored in mass storage platform like cloud for the calculation of green score and also employed for billing purpose by the government agencies. This integrated platform can replace the manual billing and directly benefits the government.

Keywords: Cloud Computing, green energy, green home system, Internet of things, smart sustainable city, smart taxation, wireless sensor network.

Tour Planning Design for Mobile Robots Using Pruned Adaptive Resonance Theory Networks

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Abstract: The development of intelligent algorithms for controlling autonomous mobile robots in real-time activities has increased dramatically in recent years. However, conventional intelligent algorithms currently fail to accurately predict unexpected obstacles involved in tour paths and thereby suffer from inefficient tour trajectories. The present study addresses these issues by proposing a potential field integrated pruned adaptive resonance theory (PPART) neural network for effectively managing the touring process of autonomous mobile robots in real-time. The proposed system is implemented using the AlphaBot platform, and the performance of the system is evaluated according to the obstacle prediction accuracy, path detection accuracy, time-lapse, tour length, and the overall accuracy of the system. The proposed system provide a very high obstacle prediction accuracy of 99.61%. Accordingly, the proposed tour planning design effectively predicts unexpected obstacles in the environment and thereby increases the overall efficiency of tour navigation.

Keywords: Autonomous mobile robots; path exploration; navigation; tour planning; tour process; potential field integrated pruned ART networks; AlphaBot platform


1 Introduction

Fixed robotics have been widely applied for many years in numerous settings where environmental conditions are known with a very high degree of certainty. However, mobile robots have the capacity to perform a much wider range of activities, such as explore terrestrial, underwater, aerial, and outer space environments, transport cargo, complete complex tasks, perform surgery, assist in warehouse distribution centers, support security, act as a personal assistants, aid in space and ocean exploration, and provide guidance for navigation [1–4]. Mobile robots that implement well-defined tasks in highly controlled environments rely upon preprogrammed or externally communicated instructions and guidance rules for moving about the environment, and generally implement only simplistic obstacle avoidance algorithms. In contrast, the goal of autonomous mobile robots is to implement tasks within uncontrolled environments without any external direction. Accordingly, autonomous mobile robots must maneuver around obstacles, in



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An Identity-Based Secure and Optimal Authentication Scheme for the Cloud Computing Environment

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Abstract: Security is a critical issue in cloud computing (CC) because attackers can fabricate data by creating, copying, or deleting data with no user authorization. Most of the existing techniques make use of password-based authentication for encrypting data. Password-based schemes suffer from several issues and can be easily compromised. This paper presents a new concept of hybrid metaheuristic optimization as an identity-based secure and optimal authentication (HMO-ISOA) scheme for CC environments. The HMO-ISOA technique makes use of iris and fingerprint biometrics. Initially, the HMO-ISOA technique involves a directional local ternary quantized extrema pattern-based feature extraction process to extract features from the iris and fingerprint. Next, the features are fed into the hybrid social spider using the dragon fly algorithm to determine the optimal solution. This optimal solution acts as a key for an advanced encryption standard to encrypt and decrypt the data. A central benefit of determining the optimal value in this way is that the intruder cannot determine this value. The attacker also cannot work out which specific part of the fingerprint and iris feature values are acted upon as a key for the AES technique. Finally, the encrypted data can be saved in the cloud using a cloud simulator. Experimental analysis was performed on five fingerprint and iris images for a man-in-the-middle attack. The simulation outcome validated that the presented HMO-ISOA model achieved better results compared with other existing methods.

Keywords: Data security; authentication; identity-based authentication; optimal key generation; biometric

1 Introduction

Data security is considered to be the major constraint in cloud computing (CC). Intruders can hack by using the man-in-the-middle (MIM) attack [1], where development, duplication, and elimination of data take place with no data authentication. Thus, the legal owner experiences a drastic loss because of unauthenticated actions. Confidential data has to be encrypted before sending it to the legitimate user to overcome these vulnerabilities. In the last few decades, password-based authorization has been applied to encrypt data. However, this approach has numerous short



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Smart Groundnut Farming using IoT

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Abstract

Our country major income from agriculture due to availability of cultivation land and delta's. Our country is top most food producer in the world. Life of everyone is based on the agricultural. Due to various reason farmers and agricultural is always towards downward. The main barriers are sudden rain, water scarcity, crops attacked by animals and insects, lack of fertilizers etc. To overcome all the problems is initiation of modern technologies with traditional method especially in cultivation land. Automation based agriculture help to solve the problems. IOT technology which helps to overcome the problem in agriculture in our country. IOT is usually transfer data between one things to another things major device are sensors, actuators and other digital devices. The proposed system has soil moisture sensor, smoke sensor and ultrasonic sensor to found event and environment conditions like presence of fire and animal in cultivation area and it send message for further proceeds water motor is based on soil moisture level, sprinkling of water to control the fire, activation of mechanism to avoid the entry of animals into cultivation area and also spraying the pesticides to control pest can be done. This method used to get more profit in agriculture and make agriculture field as evergreen.

Keywords:-IOT, soil moisture sensor, smoke sensor, ultrasonic sensor

INTRODUCTION

Agriculture is one of the sectors where the employment is always available in india. Due to the increase of population production of food also having more demand in society. In future demand of food will be main problem for peoples and for farmer problems are weather condition and sudden climate change so it should be overcome to meet the success. Smart IOT technology will help farmer to increase the productivity with amount of fertilizer, water need is another problem. Agriculture land needs water for crop so conserve water better. Fire also destroying the crop and animals destroying the crop also some animals injured the farmers. This factor has probability of affecting 15 % in

cultivation. Finally shortage of food and farmers commits suicides automation is the only way to reduce risk factor and improve the development frequently monitor the agriculture system improvement in agriculture leads to improvement in food production development in agriculture is development of country economic strategy. However some farmers still using traditional method and getting less yield of crops. IOT technology is smart work process is easy and intelligent in nature become informative explore technology leads to solution for whole world groundnut farmers and groundnut agriculture.

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