

Original Article | Published: 05 March 2021

Dynamic Power–Frequency Control in a Hybrid Wind–PV Plant Interlinked with AC Power System

Asim Datta , Indrajit Koley, Goutam K. Panda, Alejandro C. Atoche & Javier V. Castillo

Journal of Electrical Engineering & Technology **16**, 1469–1479 (2021) | [Cite this article](#)

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Abstract

Hybrid renewable energy-based generation can improve the reliability in power supply. While avoiding the big cost in energy storage/battery, it is apparent that, such hybrid plants could be interlinked with the conventional power system for ensuring continuous power supply in the local area and better utilization of renewable energy sources. As generation from the renewable energy sources are intermittent, the interaction of such hybrid plants with the traditional power network can abruptly disturb the power/frequency level. Thus, devising a robust power–frequency control (PFC) scheme for the contemporary hybrid renewable interlinked power systems is highly obligatory. In this context, this paper presents a fractional-order-proportional-integral-derivative (FOPID) controller based advanced PFC scheme. Bacterial-foraging optimization (BFO) technique is adopted for computing the design parameters, namely, the controller gains and set-point weights. A typical hybrid wind-photovoltaic (PV) Plant interlinked thermal power system is modelled and simulated in order to investigate the system dynamics. Effectiveness of the proposed PFC scheme corroborated with the renewable power variations as well as load perturbation is confirmed and the results

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RESEARCH ARTICLE

Coordinated AC frequency vs DC voltage control in a photovoltaic-wind-battery-based hybrid AC/DC microgrid

Asim Datta ✉, Alejandro C. Atoche, Indrajit Koley, Rishiraj Sarker, Javier V. Castillo, Kamalika Datta, Debasree Saha

First published: 16 August 2021 | <https://doi.org/10.1002/2050-7038.13041> | Citations: 1

Funding information: Department of Science and Technology, Ministry of Science and Technology, India

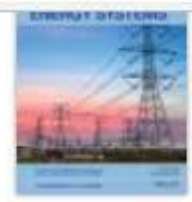
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Summary

The intermittent nature of renewable energy generation and the variable AC and DC loads are major factors that offer great challenges in power management for AC/DC hybrid microgrids. In this context, this paper presents a coordinated AC frequency vs DC voltage control (CFVC) scheme for managing contemporary renewable energy-based hybrid AC/DC microgrids. The proposed control strategy enables appropriate power interactions between the AC and DC subgrids while sharing power fluctuations in a coordinated way. Both the AC and DC subgrids support each other in accordance with their normalized relative changes in AC frequency and DC voltage, respectively. The proposed CFVC scheme is designed using fractional-order-proportional-integral-derivative (FOPID) controllers, and bacterial-foraging optimization (BFO) method is employed for calculating the design parameters, viz. the controller gains and set-point orders. A typical photovoltaic (PV) wind-battery-based hybrid AC/DC microgrid is modelled and investigated, and the usefulness of the proposed scheme is validated under the renewable energy variations and load perturbations.

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IMPLEMENTATION OF LOAD FREQUENCY CONTROL SCHEME FOR A MICROGRID SYSTEM: APPLICATION OF A HYBRID TEACHING-LEARNING-OPTIMIZATION DIFFERENTIAL-EVALUATION BASED ALGORITHM

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Abstract

In electrical power systems, the load frequency control (LFC) is a crucial aspect for maintaining a balance in between the power generation and load demand in order to avoid system frequency deviation. The present work aims to implement an effective LFC scheme for a microgrid system comprising of diesel generator (DEG), wind turbine generator (WTG), and battery storage. Proportional integral double derivative (PID) controllers are used to implement the LFC scheme. The controller parameters are computed using a hybrid teaching-learning-optimization differential-evaluation (hTLO-DE) algorithm. The results obtained using PID controllers are compared with that found with the conventional PI and PID controllers. A critical analysis reveals that the PID controller shows better dynamic responses in terms of settling time and magnitude of oscillations compared to the PI and PID controllers. Moreover, the robustness of the proposed PID based LFC scheme is ascertained under different system loadings.

Keywords

Load frequency control (LFC), Microgrid system, Diesel/wind/battery, Hybrid teaching-learning-optimization (TLO) differential-evaluation (hTLO-DE) algorithm, Proportional integral double derivative (PID) controller

1. INTRODUCTION

Microgrid is demarcated as a unification of controllable loads and distributed energy resources (DERs) like wind turbine generator (WTG), diesel generator (DEG), battery storage, etc., in arranging a local electric power network [1]. Renewable energy sources (RESs) are getting importance considering the present fossil fuel crisis and environmental issues. From another aspect, the conventional fossil fuel based generation is always reliable as does not depend on weather conditions. The idea of mixing renewable and conventional energy generations relies on the equilibrium among the reliability in generation, cost of generation, and environmental issues [2]. But in connection with the renewable energy-based distributed generations (DGs), there are many challenges like controllability, islanding operation, stability of the system, etc. [3] [4]. In grid-connected mode, the grid strongly commands the voltage and frequency at the DG interconnecting points. Nevertheless, the main challenge in the operation of a renewable energy based DG is its steadiness in islanded mode. The power storage system in a microgrid can endorse the power balance in non-islanded mode [5], but the presence of a competent LFC scheme is highly essential to uphold the system frequency [6].

The goal of LFC is to minimize frequency deviation by regulating the power flow of DERs in the system. Thus, it tracks the system frequency and tie-line power flows, and adjusts the generation within the region in order to maintain the time average of the area control error (ACE). ACE is usually considered as the measure of regulation in LFC. Both frequency and tie-line power errors are to be near zero, as to reduce the ACE. Due to the high infiltration of erratic RESs, fluctuations in power generation cause frequent mismatch in demand and supply [7], which leads to frequency deviation in microgrid. Frequency stability

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Year : 2021, Volume : 11, Issue : 5
First page : (12) Last page : (17)
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Economic development of eastern region of India: A study on the entrepreneurial scenario of the region

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Online published on 25 August, 2021.

Abstract

Entrepreneurship is ever more considered to be essential to development of a region. Policymakers have recognized the association between entrepreneurship and economic development. Yet little attention is given to why this relationship has not been harnessed properly for the economic development of the eastern region, especially the North Eastern region. This paper tries to study and understand the potential opportunities and challenges faced by entrepreneurs in these parts of India. The study, being exploratory in nature, utilizes secondary research for the purpose. The study reveals that in general eastern region, particularly the North Eastern region, lacks in entrepreneurially induced development. Many factors are responsible for this situation foremost being governmental apathy, lack of access to capital and government funds, high investment costs, political unrest, insurgency, law and order problems, union related issues, infrastructural issues etc. This paper is an attempt to offer useful information for policymakers, practitioners and scholars.

Keywords

Eastern Region, Entrepreneurship, Development, Government.

A literature review on Green HRM and Sustainability Practices in India

Rajeev Dutraj

Abstract

The utilisation of regular assists and substantial growth has become a important issue in the advanced world.Scholastic specialists and experts have lately pulled with it comes to Green Human Resource Management (Green HRM).This paper has made thorough examination and review of literature to investigate the importance of the green human asset in the modern work of business where concern of carbon emissions is an utter concern for everyone.Scrupulous approaches of worldtowards saving the earth and keeping it green have brought to the need and inception of a newer concept in the field of business and management, referred to as Green human resource management or simply ‘Green HRM’. This concept help us to understand as the process of greening organisations along with their people and policies.The topic of environmental sustainability has always brought an increased concern among business executives, government, consumer and management scholar. Environmental issues have not been completely inserted in the traditional HRM practices such as selection, recruitment, rewards, career planning for good environmental performances. Almost all the functional departments in organisations are conscious about green practices, wherein HR department plays a vital role as being the nervous system of an organization.The present study, therefore, intended to explore various practices that must be undertaken in order to make the organisations green.

Keywords: Green HRM, Employee commitment, Environment Sustainability

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An Examination of Implementation of Whistle-blowing Policies in Organizations

¹Dr. Shuvendu Dey ²Subrata Ghosh

Abstract

Fraud appears to be rising in the business world, with employees and management being the greatest perpetrators. A global survey by PricewaterhouseCoopers in 2009 found that at least 30% of companies had experienced fraudulent misdemeanors. Corporate Governance has fast emerged as a yardstick for evaluating corporate excellence in the context of national and international business practices. From guidelines and desirable code of conduct few years ago, corporate governance is now recognized as a model for improving competitiveness and enhancing efficiency and thus improving investors' confidence and accessing capital, both domestic as well as foreign. What is important is that corporate governance is becoming a dynamic concept and not static one. But for this to happen it is imperative that there exist a robust whistle-blowing mechanism that would provide employees with a high level of disclosure regarding the whistle-blowing process. The results of the study suggest that the degree of whistle-blowing disclosures is positively associated with the acceptability of anonymous reporting and organizational support for whistle-blowing, the composition of the audit committee, and the extent of concentrated shareholdings. The sheer existence of whistle-blowing disclosures could just be symbolic and nothing more.

Keywords: Fraud, Corporate Governance, Whistle-blowing, Employees, Management

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Original Research Paper Management

HEALTHCARE MARKET IN POST COVID-19 ERA A CASE STUDY OF NORTH BENGAL

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ABSTRACT North Bengal- covering districts Darjeeling, Jalpaiguri, Coochbehar, Kalimpong, Alipurduar, Uttar Dinajpur and Malda of West Bengal are having the border areas of neighboring states Assam, Bihar and Sikkim and also border areas of neighboring countries like Nepal, Bhutan & Bangladesh. As a result people from neighboring states / countries also avail the healthcare facilities in different districts of North Bengal. But deployment of healthcare amenities varies penetratingly across northern areas of West Bengal. The present study applies market survey tools to explore present status of utilization of health care is affected by different socio-economic, demographic, and other relevant factors in the rural and urban areas of northern part of West Bengal and adjacent states of India and neighboring countries. The present study does an analysis of user's perception regarding choice of health care and computes salience of different opinions towards utilization of health care facilities for minor to severe ailments. Patients' or households' inclination for expenditure for different types of health care facilities that has a significant deperiment on the use of different types of health care where both public and private sectors run parallel with different recognized systems of medicines.

KEYWORDS : North Bengal, Heath-care Market, Public and Private sectors

INTRODUCTION North Bengal - covering districts Darjeeling, Jalpaiguri, Coochbehar, Kalimpong, Alipurduar, Uttar Dinajpur and Malda of West Bengal are having the border areas of neighbouring states Assam, Bihar and Sikkim and also border areas of neighbouring countries like Nepal, Bhutan & Bangladesh. In different districts of North Bengal, health care sector is solely dependent on government aided hospitals or

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Conditions on Using the Furlough Scheme and Job Retention in Pandemic Situation

Debayan Nandi*

Abstract

Employers of all sectors are in absolute need to put some or all of their staff on temporary leave ('furlough') during the corona virus (COVID-19) pandemic outbreak. This employment jargon means an employee or worker can agree with their employer to be put on furlough to stop work in the interim but continue the status of being employed. 'Flexible furlough' to work some of their usual hours and be put on furlough for the hours they do not work. This can be a difficult time for both employers and staff. It's a good design to make certain staffs have a way to converse with the employer and other people they work with. As per the last notification the Corona virus Job Retention Scheme (CJRS) will be continued up to 30th September 2021 in United Kingdom. Employers can also put someone on furlough if he/she is for the time being unable to work because they are at higher risk, they have been advised to stay at home by their doctor because of a health condition or they have childcare responsibilities or they are kind enough for a person in their household who is at higher risk. This article explored all the possible employment terms and conditions mostly followed by different nations of the world to combat with the pandemic situation as well as taking care of the employees benefits.

Keywords: Furlough (temporary leave), job retention, CJRS, Pandemic situation.

***Debayan Nandi**, Asst Professor, Department of Business Administration, Siliguri Institute of Technology, Email: debaisit@gmail.com

Influence of Additive White Gaussian Noise on the OEO Output

Publisher: IEEE

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Arindum Mukherjee ; Shantanu Mandal ; Dia Ghosh ; B. N. Biswas [All Authors](#)

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Impact Statement:

We report on the output parameters of a single loop OEO under the influence of AWGN. It is significant because this OEO, when used in PLL for capturing signals from a spacecraft in deep space missions, would receive signals which are buried under AWGN. This work investigates the parameters by which the output to input carrier-to-noise ratio can be improved. The frequency response characteristics and the stability zones of the proposed system have been discussed in detail. The paper should be of interest to readers in the areas of optical communication, microwave photonics and Radio-over-Fiber systems employing OEO as it is considered to be one of the most significant components of recent microwave photonics systems for generating ultra-pure and long-term stable microwave signals.

Abstract:

This paper audits the output carrier-to-noise ratio of a single-loop OEO when the incoming signal is contaminated with additive white Gaussian noise. Investigations have been carried out for the possibility of increasing the output carrier-to-noise ratio. A detailed analysis of the hysteresis or 'jump phenomenon' of the single-loop OEO has been reported by utilizing the Lyapunov stability criterion. The total output distortion power has been derived assuming Carson's rule for bandwidth to hold, at the input port of the OEO. It has been observed that the injection synchronized OEO acts as an amplifier when the incoming FM signal is contaminated with noise.

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Abstract:

In this letter, a novel and compact 180° circular sector microstrip antenna has been proposed. The patch surface has been designed with a proper design insight to perturb and control the orthogonal surface current paths and orthogonal field components at the truncated edges for suppression of cross-polar (XP) radiations over the whole elevation without hampering its radiation pattern and bandwidth. The proposed antenna gives consistently better performance with different (large, medium, and small) ground plane sizes in spite of massive miniaturization (of 82%) with reference to conventional circular microstrip antenna at the same frequency. The proposed antenna can also be circumscribed completely within a sphere of radius $(N/2\pi)$, i.e., wheeler limit and hence can stand well as a small antenna.

Published in: IEEE Antennas and Wireless Propagation Letters (Volume: 20 , Issue: 3, March 2021)

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Research Article

Experimental Verification of a New Oscillation-based Test Algorithm for Analog Circuits

M. Parai, S. Srimani, K. Ghosh & H. Rahaman

Published online: 02 Nov 2021

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Abstract

Oscillation-based test algorithm has been proposed and verified experimentally as an alternative to the specification--based test of analog circuits. Active filters are transformed to oscillators using nonlinear feedback, realized with a Schmitt trigger. Faults are detected based on the deviation of the oscillation frequency outside the tolerance band due to the variation of different circuit components under test. This proposed technique ensures high test precision due to the processing of the oscillation frequency with the help of a purely digital circuit. Undetectable ranges of parametric faults of circuit components have been identified by simulation with Cadence virtuoso using the 0.18 μm CMOS technology. Then, practical circuits of second order Butterworth Low Pass Filter and Sallen-Key Band Pass Filter have been tested experimentally. Experimental results ensure high fault coverage of the proposed test strategy.

KEYWORDS:

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International Journal of Computational Vision and Robotics > 2021 Vol.11 No.3

Title: Human skin ringworm detection using wavelet and curvelet transforms: a comparative study

Authors: Manas Saha; Mrinal Kanti Naskar; B.N. Chatterji

Addresses: Electronics and Communication Engineering Department, Siliguri Institute of Technology, Sukna-734009, West Bengal, India ' Electronics and Telecommunication Engineering Department, Jadavpur University, Kolkata-700032, India ' Department of Computer Science and Engineering, B.P. Poddar Institute of Management and Technology, 137, VIP Road, Kolkata-700052, India

Abstract: The common human skin disease called ringworm is investigated in the light of computer vision. Two distinct methodologies are developed for its detection. The first methodology implements three-level multi-wavelet decomposition of the skin images and subsequent evaluation of the approximation and detail subband energies which act as the texture characterising features. The second methodology incorporates the curvelet to segment the circular protrusion of the skin images especially with ringworms followed by statistical texture investigation by grey-level co-occurrence matrix (GLCM). After feature extraction by both the methodologies, binary classifier called the support vector machine (SVM) recognises the images as ringworm with detection accuracy of around 87% and 80% for the first and second methodologies respectively. In addition, the performance indexing parameters of SVM classification like sensitivity, specificity, positive predictive value (PPV) and negative predictive value (NPV) which are not previously addressed are evaluated. Both the methodologies are comprehensively demonstrated and compared to select the better one. The selected method is then compared with the available technique and commented upon.

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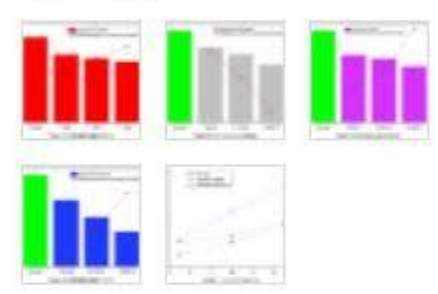
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Effectiveness of fly ash, zeolite, and unburnt rice husk as a substitute of cement in concrete

Mahadeb Das^a, Suman Kumar Adhikary^b, Zymantas Rudzionis^b

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Abstract

This experimental study analyzed the impacts of unburnt rice husk, fly ash, and zeolite on the strength of glass powder added concrete. At the first stage of the study up to 30% mass of fine aggregates was replaced by glass powder to understand the impact of the glass powder on the strength of concrete. Study results show that increasing the concentration of glass powder tends to decrease the compressive strength of the concrete. The relative decrease in compressive strength with 10% and 30% content of glass powder was measured at 9.5% and 13.3%, respectively. Furthermore, at a 10% constant concentration of glass powder several concrete specimens were prepared using unburnt rice husk, fly ash, and zeolite powder as replacement of cement (up to 15%). Study results indicate that the use of unburnt rice husk, fly ash, and zeolite with the combination of glass powder decreases the compressive strength of concrete. The lowest reduction rate was observed for fly ash added concrete, while the addition of unburnt rice husk shows the highest

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A Statistical Approach of Analog Circuit Fault Detection Utilizing Kolmogorov–Smirnov Test Method

Authors: [Supriyo Srimani](#), [Manas Paraj](#), [Kasturi Ghosh](#), [Hafizur Rahaman](#) [Authors Info & Claims](#)

Circuits, Systems, and Signal Processing, Volume 40, Issue 5 • May 2021 • pp 2091–2113 • <https://doi.org/10.1007/s00034-020-01572-x>

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Abstract

Abstract

This work presents a testing technique based on ‘Kolmogorov–Smirnov’ (K–S) test for detection of parametric faults in analog circuits. The proposed method is a time-domain signal processing technique that compares the statistical similarity in terms of ‘Empirical Cumulative Distribution Function’ (ECDF) of the outputs of the circuit when the input of the circuit is a random analog signal. ‘Multivariate Adaptive Regression Splines’ (MARS) technique is used to map the tolerances of functional metrics to the components of the circuit under test (CUT). Two benchmark circuits, i.e., second-order Sallen–Key band-pass filter and weakly nonlinear cascade amplifier are tested to validate the proposed fault detection



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An IoT based building health monitoring system supported by cloud

Debayoti Misra , Gautam Das & Debaprasad Das

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Abstract

In this paper, we have proposed a smart building health monitoring system to avoid unwanted mishaps. Some accidents take place with no warning. The work in this paper presents an internet of things (IoT) based building health monitoring (BHM) system. The system comprises Piezoelectric sensors, Arduino and ESP8266 Wi-Fi module. Piezoelectric sensor (PZT) is used to generate and receive Lamb waves and the received wave is further analyzed to determine the health of the concrete structure. The approach is unique and uses cloud and mobile app-based monitoring. There are two important features of the suggested system; it monitors the damage in concrete structure and uploads the data to the cloud server. The exclusive technique takes the help of cloud sever system for its favorable position of data usability, ease of access and disaster recuperation. This proposed system generates all details associated with structural health of a specific building and can inform to the responsible authority for corrective measures. So that it can avoid mishaps and save lives, money, and properties.

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Published: 22 February 2020

Analog Circuit Fault Detection by Impulse Response-Based Signature Analysis

Manas Paraj, Supriyo Srimani, Kasturi Ghosh & Hafizur Rahaman

Circuits, Systems, and Signal Processing 39, 4281–4296 (2020) | [Cite this article](#)

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Abstract

This paper presents a method for the detection of parametric faults in linear filters with the help of impulse response which is studied on the basis of cross-correlation, a statistical metric. Impulse input is generated with delay flip flops and R–C circuit with minimum circuit complexity. Cross-correlation of impulse responses of the faulty and non-faulty circuits is fitted with Gaussian function. Component tolerances are mapped to statistical metric spaces in terms of Gaussian fitting parameters by Monte Carlo simulation. The proposed method is validated with simulated (using UMC-180 nm technology in CADENCE Virtuoso platform) as well as experimental results. Two benchmark analog filter circuits, second-order Sallen–Key band-pass filter and fourth-order Chebyshev low-pass filter, are considered as test circuits. The present method requires minimum circuit complexity and computational effort. The proposed fault detection technique is applicable for any linear analog circuit.

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Wind Energy Infiltrated Multi-Area Power System: Optimized 2-DOF-FOPID Controller for LFC

Indrajit Koley, Asim Datta, Goutam Kumar Panda

Abstract

The major concern for deviation of frequency in renewable energy penetrated power generating system is the intermittent nature of the inputs in addition to variable load demand. This paper investigates load frequency control (LFC) of a thermal-wind-thermal based hybrid power generating unit. A two-degree-of-freedom (2-DOF) fractional-order-proportional-integral-derivative (FOPID) controller is implemented to control the frequency of the proposed system. Cuckoo search algorithm (CSA) is applied to optimize the gains parameters of the proposed controller. The results obtained from the proposed CSA tuned 2-DOF-FOPID controller are compared with the traditionally well-known conventional controllers. MATLAB simulation shows that, compared to the conventional widely applied PI and PID controllers, the presented controller reveals superior response in terms of lesser transient time, less overshoot, wide robustness to limit the frequency deviation (FD) within the acceptable range considering integral square error (ISE) as an objective function.

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INFORMATION

EXPERIMENTAL STUDY ON COMPRESSIVE STRENGTH OF CONCRETE USING FLYASH AND SUGAR

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Abstract - The compressive strength of concrete varies if we use different parameters. We test the compressive strength of concrete cube M25, of size 150X150x150 using selected above parameters. A set of 3 cubes are prepared to be tested on 7, 14, and 28 days after being properly mixed and cured. In this test case we observed that the compressive strength increases as the days of curing increased

Keyword: Sugar cane ash, cement, sand, aggregate, Compressive Strength.

INTRODUCTION

Ordinary Portland cement is recognized as a major construction material through our world. Many researchers all over the world are focusing on utilizing the industrial or agricultural waste material industrial waste such as blast furnace slag fly ash and silica fume are used as replacement of cement and RHA and baggage ash are agricultural waste replaced by cement when agricultural waste is buried under controlled condition that gives good properties like amorphous silica pozzolanic properties etc.

partially. Researchers has said that the usage of sugar cane baggage ash as a partial replacement of cement.

2. MATERIAL AND METHODOLOGY

Fly ash: known as flue-ash is one of the residues generated in combustion and comprises the fine particles that rise with flue gases. Ash that does not rise is called bottom ash. In an industrial context fly ash usually refers to ash produced during combustion of coal. Fly ash generally captured by electrostatics precipitators or other particles filtration equipment before the flue gases reach the chimneys of coal fired power plants and together with bottom ash is removed from the bottom of the furnace is in the case jointly known as coal ash. Depending upon the source and make-up of the coal being burned the component of the fly ash vary considerably but all the fly ash includes substantial amounts of silicon dioxide(SiO₂) and calcium oxide(CaO), both being endemic ingredients in many coal bearing rocks strata.

Cement : volcanic ash and pulverized brick supplements that were added to the burnt lime, to obtain a hydraulic

Outline

Highlights

Abstract

Keywords

1. Introduction;
2. Results and discussion
3. Conclusion

Declaration of Competing Interest

Acknowledgement

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 Table 1



Materials Letters

Volume 258, 1 January 2020, 126792



AC conductivity and dielectric behavior of Cu-S-Te chalcogenide glassy system

Svarupa Ojha ^{a,*}, Madhab Roy ^a, Anil Chamuah ^a, Koyal Bhattacharya ^a, Sanjib Bhattacharya ^{a, R, OR}

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Highlights

- Preparation of chalcogenide glassy system, $x\text{Cu}-(1-x)(0.5\text{S}-0.5\text{Te})$
- Almond-West formalism and AC conductivity.
- Dielectric Studies and electric modulus.
- Structural parameter and dislocation density.
- Thermally activated conductivity relaxation time.

Abstract

Here, the development of new chalcogenide glassy system has been reported. The AC conductivity and dielectric behaviour of them have been studied. X-ray diffraction (XRD) has been used as probe to reveal microstructure of them. Almond-West Formalism and Electric modulus formalism have been employed to interpret AC conductivity data and to explore their dielectric behavior respectively. Structural parameter (β) and dislocation density of them have been estimated to interpret electrical measurements data.

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