IEI Epitome

October 2019, Volume 4, Number 10

Contents

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Members in the News

Dr R Venkatesan, FIE

Scientist and Programme Director, National Institute of Ocean Technology, Government of India
Member Mechanical Engineering Division Board, IEI, Member, Research & Development Committee, IEI
Member, Board of Management, Engineering Staff College of India (ESCI)

Dr R Venkatesan is nominated for the Marine Technology Society (MTS) Fellow Award – the highest recognition in the field of marine technology for his outstanding contributions to the Marine Technology Society and Industry. He also obatined PG Diploma in Maritime Law in 2019 from Dr Ambedkar Law University Govt of Tamil Nadu and secured first rank.

Dr Venkatesan would be presented with the Award during the OCEANS North America Conference during October 27-31 in Seattle, Washington.

Mr R Selvaraj, FIE

Senior Deputy General Manager (Retd), Bharat Heavy Electricals Limited, Tiruchirapalli & Member, Production Engineering Division Board, IEI

Mr R Selvaraj delivered Lecture on 'Engineering for Change' during the auspecious occasion of 52nd Engineers Day Celebration in Seshasayee Institute of Technology, Ariyamangalam, Tiruchirapalli on September 16, 2019.

Dr Komal Parag Mehta, AMIE

Professor and Head, Civil Engineering Department, ITM (SLS) Baroda University, Gujarat

Dr Mehta was awarded 'Best Teacher Award in Higher Education Category' by Hon'able Governor of Gujarat, Mr O P kohli on 6 April,2019 for her contribution in higher education field.

Prof (Dr) T Phani Madhavi, AMIE

Professor & Dean(Research), Head of the Department, Department of Civil Engineering, Nalanda Institute of Engineering &Technology, Guntur District, Andhra Pradesh

Participated in UGC-Sponsored Short Term Course on "Ground Improvement Methods and Assessment of their Quality Control" from 16-09- 2019 to 21-09-2019 held at University Grants Commission-Human Resource Development Centre(HRDC), Jawaharlal Nehru Technological University Hyderabad, Hyderabad, Telangana State(India).

Dr Manoj Kumar Mahawar, AMIE

Scientist, Agricultural Process Engineering, ICAR-Central Institute of Post-harvest Engineering and Technology (CIPHET), Abohar, Punjab

Received IEI Young Engineer Award 2019-20 in Agricultural Engineering Division. This award was presented by Hon'ble Chief Minister, Tripura, Mr Biplab Kumar Deb, during the 33rd National Convention of Agricultural Engineers and National Conference on "Commercial Crops Processing and Value Addition" at Pragna Bhawan, Agartala, Tripura, during10-11 August, 2019.

Prof Abhijit Mitra, FIE

Principal, University Institute of Technology (UIT), The University of Burdwan

Delivered an invited talk at CVPR Unit, Indian Statistical Institute (ISI), Kolkata, on March 25, 2019, under CVPR Unit lecture series, on the topic 'Mobile BTS Power Density Measurement in Densely Populated Areas in Kolkata'.

Delivered an invited talk at Bardhaman Science Centre, Ministry of Culture, Govt. of India, on April 18, 2019, under the Lecture Series of Swachh Bharat Programme on the topic 'Electronic Waste Management: Environmental & Social Issues'.

Invited as a Resource person at Bardhaman Science Centre, Ministry of Culture, Govt. of India, on September 13, 2019, during the Teachers Training Programme and delivered a lecture on the topic 'Inclusion of Basic Electronic Projects at 10+2 Practical Level'.

Members in the News

Dr Diwakar Z Shende, MIE
Assistant Professor, Department of Chemical Engg., Visvesvaraya National Institute of Technology, Nagpur
E-mail: diwakar.shende@gmail.com

Title of Patient: "Process for Coating of Metal and Metal Oxides on Hollow Ceramic Microspheres", *Indian Patent vide Patent No. 316279 dated: 17/07/2019, Application No. 201621034195 dated: 05/10/2016.*

Co-holders of Patient Rights : Ms Vishakha Makode, Dr Kailas L Wasewar, Dr Swapnil P Wanjari

Brief of Patient: The invention is the path-breaking milestone in world of smart material. The invention is the outcome of research work on exploration of specific and high end applications of Fly Ash Cenosphere harvested from the Ash ponds of Thermal Power Plants. Currently, bulk applications of Fly Ash are being found in cement manufacturing, cement substitution, road embankment, low lying area filling, mine filling, brick manufacturing, agriculture and other uses. Cenosphere (Hollow Ceramic Microspheres), present in Fly Ash in the range of 1.5-2.0%, can be separated as the floating material in the slurry stage of Fly Ash in lagoons with collection at the edges of lagoon by labours with the help of shovel and packaged in bags. Being hollow sphere, Cenosphere is very light in density, reasonably good surface area and crushing strength, very low thermal conductivity, significant thermal stability, high softening and melting point, particle size range of 5-500 microns and chemically inert. These excellent properties of Cenosphere can be subjected for its high end applications in RADAR and EMI shielding for Aerospace field, building and infrastructure work, insulation and plastics, automobiles, nuclear waste management and in oil well drilling. The idea in the invention was to develop the controlled and fine tuned magnetism on cenosphere by developing the process of coating of Fe_3O_4. The cenosphere coated with Fe_3O_4 can find its application of all the desired original characteristics along with the generated magnetic properties, in RADAR and Aerospace design and engineering.

Call for Papers for Annual Technical Volume

Engineering Division Boards	Theme	Last Date for Paper Submission	E-mail ID for Paper Submission
ASDB	Aerodynamics and Propulsion – Indian Scenario	November 15 2019	asdb@ieindia.org
MRDB	Blue Economy, Challenges and Opportunities in the Field of Marine Engineering	November 15 2019	mrdb@ieindia.org
MCDB	Advances in Automobiles and Applied Locomotives	November 15 2019	mcdb@ieindia.org
PRDB	Applications of New Tools and Techniques in Manufacturing and Processing	November 15 2019	prdb@ieindia.org

Publication

Dr Komal Parag Mehta, AMIE
Professor and Head, Civil Engineering Department, ITM (SLS) Baroda University
E-mail: komalshahmehta@gmail.com

Title of Paper: "Risk Associated with use of Nano Materials", Journal of Emerging Technologies and Innovative Research (ISSN : 2349-5162), Published In JETIR (www.JETIR.org) Volume 6, Issue 6 , June-2019, October 2019, pp 261 to 266.

http://www.jetir.org/papers/JETIR1906C42.pdf

Abstract: The Next big thing is going to be this small nano which will transform the world with facilities of latest products and enhanced characteristics materials for improved quality of life. In everyday products, use of nano materials are at large scale due to its properties of being light weight and strong. Bio compactable nano materials are available for the field of medical and drugs. Till date only advantages are seen but when nano material is used at large scale, potential health risk and damage to environment are to be considered. Risk assessment, review of regulations are discussed here. There is a need for reference nanomaterials since this would allow the assessment of fate and behaviour as well as effects, which could then be related to the material's properties and characteristics. It would also allow comparisons between different nanomaterials. Some reference nanomaterials are available, but they are spherical model materials which are certified primarily for size and are used mainly to calibrate instruments which measure particle size. The absence of well-defined parameters to measure and standardise test protocols is identified as a major obstacle for reference material production.

Keywords: *Nanotechnology safety; Risk assessment; Risk mitigation; Nano-safety; Nanotechnology regulation; Nanomaterial properties*

Mr Vinay Anand, AMIE
Assistant Professor & Head, Department of Electrical Engineering, Sanskriti University, Mathura
E-mail: vinayanand77@gmail.com

Title of Paper: "Power Quality Conditioning in LV Distribution Networks: Results By Field Demonstration", *International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395-0056,p-ISSN: 2395-0072,6(6), June 2019, pp 462-468.*

Co-authors : Vandana Srivastava, Ashish Singhal

Abstract: In this research work, the multi converter unified power quality conditioner is proposed for power sharing compensation of voltage and current imperfections. Another arrangement of an UPQC known as the MC-UPQC (multiconverter unified power quality conditioner) is exhibited. The framework is enhanced by including a series VSC in an adjoining feeder. MC-UPQC (unified power quality conditioning system), fit for synchronous compensation for current and voltage in multi-feeder/multi-bus frameworks. Finally, this work analyses the performance of existing and proposed configuration and validate the simulation results. Experimental results demonstrate that proposed technique is more efficient as compared to the existing techniques.

Keywords : *Unified power quality controller; MC-UPQC; Power quality; VSC*

Publication

Mr Manoj Kumar Shukla, AMIE
Lecturer (SG), Kalaniketan (Govt.) Polytechnic College, Jabalpur, Madhya Pradesh
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Title of Paper: "Effect of Carbon Nanofillers on the Mechanical and Interfacial Properties of epoxy based Nano-composites: A Review", *Polymer Science Series A 2019 , 61(4), July 2019, pp. 439-460.*

DOI: 10.1134/S0965545X19040096

Co-author : Mr Kamal Sharma

Abstract: Carbon based nanofillers (graphene and carbone nanotube) are widely used as reinforcing agents with epoxy based nanocomposites. The aim of paper is to review mechanical properties of two phase and three phase composites, fabricated by incorporating graphene and carbon nanotube (CNT) nanofillers in epoxy resin individually followed by studying the synergetic effect of hybrid nanofillers in the epoxy resin. Discussion on verification of results by various characterization techniques such as SEM, TEM, XRD, and FTIR is done to understand the influence of filler materials on interfacial properties of composites along with presenting various diversified applications of epoxy based composites.

Keywords : *Nanofillers; Carbon Nanotube; Epoxy based Composite*

Title of Paper : "Effect of Functionalized Graphene/ CNT Ratio on the Synergetic Enhancement of Mechanical and Thermal Properties of Epoxy Hybrid Composite", *Materials Research Express 2019, 6 (8), August 2019.*

https://iopscience.iop.org/article/10.1088/2053-1591/ab1cc2/pdf

Co-author : Mr Kamal Sharma

Abstract : Hybrid fillers comprise of amine functionalized multilayer graphene (Af-MLG), amine functionalized MWCNT (Af-MWCNT) were prepared and their synergetic effects with regards of enhancing the mechanical and thermal properties of epoxy composites were investigated. The samples were fabricated by keeping the ratio of Af-MLG and Af-MWCNT nanofillers as 1:1, 1:3 and 3:1. The above-mentioned filler ratios were then mixed with an epoxy matrix by using Probe Sonication Method. X-ray diffraction (XRD)was performed for phase identification exists in nanofillers due to surface functionalization while Fourier-transform infrared spectroscopy (FTIR)was performed to obtain an infrared spectrum in nanofillers, which confirms the presence of amine group. Transmission electron microscope (TEM) used for the confirmation of uniform dispersion of nanofillers in an epoxy matrix and scanning electron microscope (SEM)was used for the study of the morphology of fractured samples occurred during the tensile test of different wt% nanofillers reinforced composites. The results indicate that the tensile strength of the hybrid composite increased by 57.1 and 50.2% for the nanocomposites with 1:3 and 3:1 respectively when compared with neat epoxy composite. Moreover, flexural modulus and strength increase by 20 and 72% respectively for the sample with filler ratio 1:3 and 3:1. In order to examine the thermal decomposition, the thermogravimetric analysis(TGA)was performed in three different stages from 300 to 700 ° C with a constant increment of 100 °C. A maximum gain of 20% was noticed for the samples with filler ratio 3:1 when compared with pristine epoxy nanocomposites. Henceforth, such hybrid nanocomposites with improved thermomechanical properties showed new pathways to many advanced structural and temperature based applications.

Keywords : *Multilayer Graphene; Probe Sonication Method; Fourier-transform Infrared Spectroscopy*

Mr Jebaveerasingh Jebadurai, AMIE
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Title of Paper: "Learning Based Resolution Enhancement of Digital Image", *International Journal of Engineering and Advanced Technology, August 2019, 8 (6), pp 3026-3030*

Co-authors : I J Jebadurai, G J L Paulraj, N E Samuel

Abstract: Image super-resolution (SR), the process that improves the resolution, has been used in many real world applications. SR is the preprocessing phase of majority of these applications. The improvement in image resolution improves the performance of image analysis process. The SR of digital images take the low resolution images as inputs. In this article, a learning based digital image SR approach is proposed. The proposed approach uses Convolutional Neural Network (CNN) with leaky rectified linear unit (ReLU) for learning and generalization. The experiments with the test dataset from USC-SIPI indicate that the proposed approach increases the quality of the images in terms of the quantitative metric peak signal to noise ratio. Further, it avoided the problem of dying ReLU.

Keywords : *Convolutional Neural Network; Deep learning; Leaky ReLU; Super-resolution*

Publication

Mr Hrishav Bakul Barua, AMIE
Researcher and Information Technology Analyst, Embedded Systems and Robotics Research Group, TCS Research and Innovation Lab, Kolkata, West Bengal
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Title of Paper: "A Comprehensive Survey on Cloud Data Mining (CDM) Frameworks and Algorithms", *A Comprehensive Survey on Cloud Data Mining (CDM) Frameworks and Algorithms. ACM Comput. Surv. 52 (5), Article 104, September 2019, pp 104-1 – 104-62.*

DOI: https://doi.org/10.1145/3349265

Co-author: Dr Kartick Chandra Mondal

Abstract: Data mining is used for finding meaningful information out of a vast expanse of data. With the advent of Big Data concept, data mining has come to much more prominence. Discovering knowledge out of a gigantic volume of data efficiently is a major concern as the resources are limited. Cloud computing plays a major role in such a situation. Cloud data mining fuses the applicability of classical data mining with the promises of cloud computing. This allows it to perform knowledge discovery out of huge volumes of data with efficiency. This article presents the existing frameworks, services, platforms, and algorithms for cloud data mining. The frameworks and platforms are compared among each other based on similarity, data mining task support, parallelism, distribution, streaming data processing support, fault tolerance, security, memory types, storage systems, and others. Similarly, the algorithms are grouped on the basis of parallelism type, scalability, streaming data mining support, and types of data managed. We have also provided taxonomies on the basis of data mining techniques such as clustering, classification, and association rule mining. We also have attempted to discuss and identify the major applications of cloud data mining. The various taxonomies for cloud data mining frameworks, platforms, and algorithms have been identified. This article aims at gaining better insight into the present research realm and directing the future research toward efficient cloud data mining in future cloud systems.

Keywords : *Data mining; Distributed computing; Cloud data mining (CDM); Cloud computing; Parallelism; Graph mining*

Mr Doredla Nagaraju, AMIE
Assistant Professor, Department of Civil Engineering, Narasaraopeta Engineering College, Guntur, Andhra Pradesh
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Title of Paper: "Perusal of Multi Storey Light Frame Shear Wall by Manual Check and Finite Element Method", *International Journal of Engineering and Advanced Technology (IJEAT) ISSN: 2249 – 8958, 8 (6), August 2019, pp 569-574.*

Co-authors: Korrapati Pratyusha, Sikakolli Maheswari, Gadela Neelima

Abstract: Shear walls are a structural system which gives solidness or stability to structures from lateral loads like wind, seismic loads. The structural systems are fabricated by reinforced concrete, plywood/timber unreinforced, reinforced masonry at which these systems are subdivided into coupled shear walls, shear wall frames, shear panels and staggered walls. The present paper work was made in the interest of studying and analysis of various research works involved in enhancement of shear walls and their behaviour towards lateral loads. In SAP2000 analysis we found that when we apply lateral force between the stories the amount of compression and tension force between the stories obtained is equal to the manual analysis .In STAAD.PRO, we analyzed the light frame shear wall for seismic analysis. The estimated results for light frame shear wall with one storey, shear wall with two storey and shear wall with three storey shown similar to the results which are obtained by using FEM software like STAAD and SAP2000.

Keywords: *Shear wall; Storey; SAP2000; Seismic; Shear Panels*

Publication

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Scientist, Agricultural Process Engineering, ICAR-Central Institute of Post-harvest Engineering and Technology (CIPHET), Abohar, Punjab
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Title of Paper: "Post-harvest Processing and Valorization of Kinnow Mandarin (Citrus reticulate L.): A Review", *Journal of Food Science and Technology, Mysore, September 2019, pp 1-17*

https://link.springer.com/article/10.1007/s13197-019-04083-z

Co-authors : Kirti Jalgaonkar, Bhushan Bibwe, Bharat Bhushan, Vijay Singh Meena, Raj Kumar Sonkar

Abstract : Kinnow is a prevalent fruit crop of the mandarin group and belongs to the Rutaceae family. It is nutritionally rich in vitamin C, vitamin B, β-carotene, calcium, phosphorous and other health beneficing compounds. The fruit is grown commercially for fresh consumption and since the processing techniques are less prominent, a plentiful amount of harvested fruit goes for waxing and grading operations. To reduce the post-harvest losses, appropriate processing techniques need to be followed as considerable fruit waste is generated while processing. The foremost fruit wastes viz. peel and seeds are rich source of bioactive compounds and can be utilized for the extraction of aromatic compounds, essential oils and low-methoxyl pectin. Overall utilization of kinnow and its components through various technological interventions will not only enhance the profitability of processing industries but also assist in reducing the pollution load on the environment. The prevailing bitterness in kinnow juice has constrained its processing, value-addition, popularity and acceptability. Limited work has been done on kinnow processing leaving scarce relevant literature published on the post-harvest management of kinnow. Efforts made by researchers worldwide, regarding the post-harvest application of kinnow and its by-products for product development, value addition and waste utilization is presented and discussed in this paper. This compiled information is envisioned to encourage the cottage food processing units in order to improvise the overall benefits along with achieving complete utilization of kinnow.

Keywords: *Bitterness; By-product utilization; Citrus reticulate L; Kinnow; Post-harvest processing; Rutaceae; Value addition*

Mr Diwesh B Meshram, MIE
Assistant Technical Officer, Central Institute of Plastics Engineering and Technology, Korba.
E-mail: diweshs@gmail.com

Title of Paper: "Effective Parametric Analysis of Machining Curvature Channel using Semicircular Curved Copper Electrode and OHNS Steel Workpiece through a Novel Curved EDM Process", *Engineering Research Express, August 2019, 1(1).*

Co-author : Y M Puri

Abstract: Electro-discharge machining (EDM) is one of the advanced non-conventional machining techniques used in industries. Most of the EDM research areas are directed towards the linear movement (up-and-down) of the electrode. Through a novel innovation, an innovative way of machining a curvature channel through a semicircular curved copper electrode is possible through curved EDM process. The experimental setup is developed and installed on the Z-axis numerically controlled(ZNC)EDM machine. The oscillating motion of curved electrode on stationary workpiece is obtained by implementing the concept of mechatronics. In this present work, we attempt to investigate the effect of input machining parameters on the output performance characteristics in curved EDM process. During pilot experimentation, critical variables are identified and selected as sparking current, pulse on time, pulse off time and angular sensitivity. Design of Experiment using Taguchi (L 9) is used to formulate the planned experiments and to evaluate the effects of input machining characteristics on Material Removal Rate (MRR), Electrode Wear Rate (EWR), Curved Machining Angle (CMA), and Curvature Depth (L). Regression analysis and Technique for Order of Preference by Similarity to Ideal Solution (TOPSIS) are effectively used to validate the model developed for the curved machining. The results obtained after experimentation predicts that the model can be accepted to optimize the quality machining characteristics in curved EDM process. Geometrical analysis and surface roughness are evaluated for the machined curvature through the advance measuring equipment's. Scanning Electron Microscopy (SEM) is also used for observing the microstructure at higher magnification of workpiece material before and after machining.

Keywords: *Curved EDM; Optimization; Taguchi method; TOPSIS; Regression analysis*

Publication

Mr Chandan Kumar, AMIE
Manager,System Study and Reliability, Eastern Regional Load Despatch Centre (ERLDC), Power System Operation Corporation Limited (POSOCO)

E-mail: chandan8240000@gmail.com

Title of Paper: "Implementation Experience of URTDSM Project in Indian Power System", 2019, *CIGRE Canada Conference, Montréal, Québec, September 16-19, 2019.*

https://cigre.ca/papers/2019/CIGRE-168.pdf

Abstract: With the evolution of Grid and addition of new power system elements like distributed generation, Grid Scale renewable, energy storage etc., the Indian Power System network has become meshed and complex. The huge demand variation over the day and bidirectional power flow have resulted in introducing new challenges in the form of optimal utilization of the asset and resources. In these dynamic scenarios, it is essential to introduce better monitoring of the power system for the system operator situational awareness. Since last one decade, Synchro phasors has become an effective tool for dynamic monitoring of the power system. Indian Power system has adopted this technology in the year 2010 in the form of pilot projects. After gaining a lot of experience in the utilization of the various pilot projects and associated Synchro phasors data, a full-fledged Synchro phasors Project was designed for Indian Power system which is known as Unified Real-Time Dynamic State Measurement System (URTDSM). The URTDSM project includes more than 1400 PMUs in the field and PDCs at 32 State Load Despatch Centre (SLDCs), 5 Regional Load Despatch Centre (RLDCs) and National Load Despatch Centre (NLDC). This paper describes the design and implementation challenges faced during the URTDSM project followed by challenges during its configuration by the system operator. In addition, it described how these issues were resolved in an amicable manner for effective utilization.

Keywords: *Synchrophasor; Indian grid; Wide area measurement system*

Title of Paper: "Impact of High Impact Low Frequency (HILF) Events on Indian Power System", The 2019 CIGRE International Symposium, Aalborg, Denmark, 4-7 June 2019.

Abstract: Indian Power System is among the largest synchronized grid in the world with a peak demand of more than 170 GW. Being unique in terms of geography and topology, the Indian power system experiences a varying degree of diversity in terms of weather and climate. It faces more than one High Impact Low Frequency (HILF) Events every year having a significant impact on the Indian Electrical Grid. The HILF events in India include Cyclones, Earthquake, Landslides, Localised Wind Squall, Flood etc. From 2013 to 2018, India has faced five major cyclones (Phailin, Hud Hud, Vardah, Ockhi and Titli), five devastating floods (Including Uttarakhand and Kerala) and three major earthquakes (including 7.7 intensity Nepal Earthquake). These events impact the power system operation right from generation to utilization of electricity through transmission and distribution. In addition to these, the localized wind squalls had also been observed on a few occasions causing transmission lines tripping and tower collapses and rapid demand loss/reduction. This paper discusses the impact of such events on the Indian grid in terms of its effect on Demand/Load, Network Strength, Flexibility of Generation, and Transmission line faults, Tools available with System operator and their Situational Awareness and decision-making process. These events also highlight the level of Reliability and Resiliency of Indian Power system. In the paper, the three fronts of power system resiliency i.e. Anticipation/Preparedness, Response and Recovery/Restoration have been explained for the events, which were predictable like cyclones/floods. It provides the lessons learned from each of these events and how they have helped during the preparation/restoration for the next events.

Keywords: *High-frequency low severity events; High impact low-frequency event; Indian grid; Power system resilience; Power system reliability*

Publication

Dr Yogendra Arya, AMIE
Assistant Professor, Electrical and Electronics Engineering Department, Maharaja Surajmal Institute of Technology, New Delhi
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Title of Paper: "Impact of Hydrogen Aqua Electrolyzer-fuel Cell Units on Automatic Generation Control of Power Systems with a New Optimal Fuzzy TIDF-II Controller," *Renewable Energy, 139, Aug. 2019, pp. 468–482*

DOI: https://doi.org/10.1016/j.renene.2019.02.038

Abstract: To circumvent equipment damage, load shedding and possible blackouts in electric power system, brisk acting energy storage units can excellently shrink the frequency and tie-line power oscillations generated due to small load perturbations. This paper investigates the impact of the energy storage hydrogen aqua electrolyzer (HAE)-fuel cell (FC) units on automatic generation control (AGC) of interconnected power systems. AGC plays the pivotal role in providing the electricity supply with good quality standards in the fast growing word of todays. For this, AGC entails highly proficient and intelligent control technique. Hence, a new fuzzy tilt integral derivative with filter plus double integral (FTIDF-II) controller is proposed for the first time in AGC field as an intelligent control technique to upgrade AGC performance of power systems with/without HAE-FC units. A recently appeared socio-politically influenced global search metaheuristic imperialist competitive algorithm (ICA) is used to tune the parameters of FTIDF-II controller. In FTIDF-II controller, asymmetrically membership functions (MFs) are employed, where MFs alongside zero provide fine-tuning and away from zero coarse-tuning. The efficacy of the control approach is critically analyzed on three 2-area power system models selected from the literature. The supremacy of FTIDF-II controller is established over FTIDF and existing PID/PIDF/TIDF/FPI/FPID/FPIDF/FPIDF-II structured controller optimized via various newly emerged optimization techniques. Investigation affirms that the dynamic performance of the systems with FTIDF-II controller improves further in the presence of HAE-FC units. Sensitivity analysis demonstrated that the proposed controller is robust and executes competently at variations in the system parameters and random load perturbations.

Keywords: *Tilt integral derivative with filter controller; Optimal fuzzy controller; Robust control; Frequency control; Hydrogen aqua electrolyzer; Fuel cell*

Title of Paper : "AGC of Restructured Multi-area Multi-source Hydrothermal Power Systems Incorporating Energy Storage Units via Optimal Fractional-order Fuzzy PID Controller", *Neural Computing and Applications, 31(3), Mar. 2019, pp 851–872*

DOI: https://doi.org/10.1007/s00521-017-3114-5

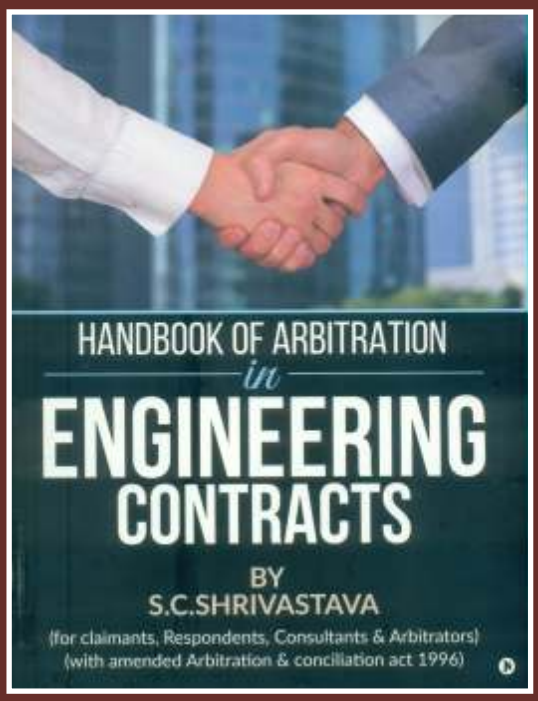
Abstract : Owing to nonlinear structure and uncertain load demand characteristics, expert and intelligent automatic generation control (AGC) is inevitable for coherent operation and control of electric power system. Hence, in this paper, to mitigate the frequency and power deviations efficiently under sudden load demand conditions, a novel fractional-order fuzzy PID (FOFPID) controller is suggested in AGC of restructured multi-area multi-source hydrothermal power systems. The parameters of FOFPID controller are optimized by utilizing bacterial foraging optimization algorithm. The controller is implemented on restructured two- and three-area systems. It is observed that the advocated method shows superiority over fuzzy PID, fractional-order PID and conventional PID control schemes. Energy storage units such as redox flow batteries (RFB) which show extremely long charge–discharge life cycle and outstanding quick response to alleviate the system oscillations under disturbances have further been incorporated into the studied systems to analyze their efficacy in boosting AGC performance. Analysis of results reveals that with RFB, system transient performance improves significantly. It is also observed that the obtained results satiate the AGC requirement under different power transactions taking place in a deregulated market in the presence/absence of appropriate generation rate constraint treated for thermal and hydro plants. Finally, the robustness of the presented approach is demonstrated against the wide variations in the system parameters and initial loading condition.

Keywords: *Multi-area multi-source system; Fractional-order PID controller; Fuzzy PID controller; Automatic generation control; Restructured power system*

Book Review

Handbook of Arbitration in Engineering Contracts

S C Shrivastava, FIE



The 'Handbook of Arbitration in Engineering Contracts' is intended for the use of working Engineers, Consultants,, Arbitrators and Lawyers. Most of the aspects to Arbitration in Engineering contracts have been included.

Indian Arbitration & Conciliation act of 1996 (with amendments made in January 2016) have been incorporated along with extracts from Indian Contract Act 1872, Limitation act, Stamp act etc.

Detailed procedure for appointment of Arbitrator, Arbitral process till the award is made, has been given with sample formats wherever required.

A number of Supreme Court judgements (both short and detailed) have also been included to cater to the different situations in Arbitration cases.

I hope a non legal professional shall also be able to understand and prepare his submissions/defense after going through this book, which has been written mainly based on author's experience of working in different capacities in Government.

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Handbook for a Complete Building Engineer

S C Shrivastava, FIE

The 'Handbook for a Complete Building Engineer' covers the topics on project planning, Construction, maintenance, water supply and sanitary installations, Electrical services, lifts, substation, fire- fighting, solid waste management ,Piped natural gas, Rainwater harvesting ,green building concepts along with Valuation and Arbitration. A technical dictionary for commonly used words is also included.

I feel that the final year students of Civil Engineering need to be made conversant with the above subjects in addition to their regular study materials so that they are better equipped when they go for the actual placements. Moreover, this being a reference book, will always be a good companion throughout their career& also will be very useful for the working Civil Engineer.

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Book Review

Inspection and Quality Control

Sekhar Basu Ray Chaudhuri, FIE
Jayanta Ghosh Roy

The evolution of philosophies and their impact on inspection and quality control has been a matter of great concern of industries as well as of professionals since long. Quality of conformance and quality of performance often played some ambiguous role to the operators of the industries. The future managers as well as engineers need effective guidelines and concept of state-of-the-art procedures on inspection and quality control for appropriate implementation.

The text book on Inspection and Quality Control authored by Prof. Sekhar Basu Ray Chaudhuri and Prof. Jayanta Ghosh Roy, makes a commendable effort to explore the understanding of basic inspection and quality control tools and techniques of industrial products used by professionals in their respective fields for achieving the optimum results. In the context of recent trend of major paradigm shift in inspection and quality control as well as emphasis on skill development, this book would be of immense help to evolve basic understanding of the contents.

It is highly expected that such kind of primer on inspection and quality control systems will provide clear road map to achieve the objectives in a lucid manner. It is the modest hope from the side of the authors that the book thereby ushers a new scope of improving the potential performance in the industrial fields.

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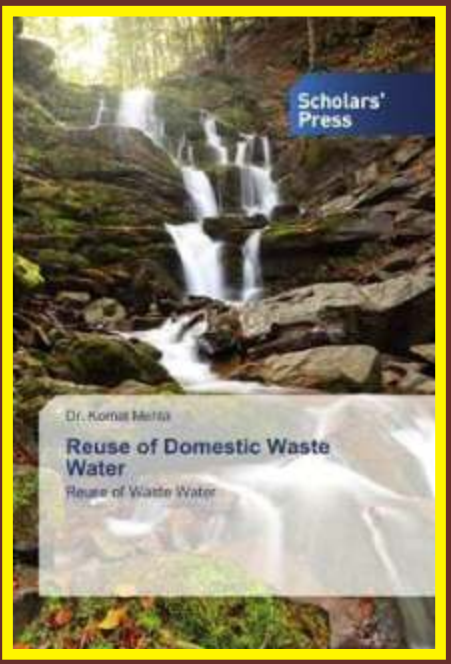
Reuse of Domestic Waste Water

Dr Komal Parag Mehta, AMIE



Water problems are increasingly recognized as one of the most immediate and serious environmental threats to humankind. Water use has increased more than three times globally since 1950 and one out of every six person does not have regular access to safe drinking water. Because of not having access to a safe water supply and sanitation, the health of 1.2 billion people is affected annually [259]. Existing sources of water can be saved with numerous approaches, both modern and traditional, that exist throughout the world for efficiency improvements and augmentation, with options such as conservation of water, ground water recharge, reuse of waste water, virtual water requirement etc. Among such approaches, wastewater reuse has become increasingly important in water resource management for both environmental and economic reasons. Wastewater reuse is having a long history of applications, primarily in agriculture and additionally it is becoming more prevalent in industrial, household and urban areas. Wastewater reuse is having a long history of applications, primarily in agriculture and additionally it is becoming more prevalent in industrial, household and urban areas. Wastewater reuse for agriculture represents the large reuse volume.

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Announcement

Contribution for Centenary Celebrations of
The Institution of Engineers (India)

The Institution of Engineers (India) has entered its next Century in September 2019 and we intend to celebrate this significant landmark in a befitting manner. Various International Seminars are being organized in India and Overseas on contemporary and innovative themes culminating in Global Engineering Congress next year. Also, IEI has launched a special outreach programme to induct new members into its' fold along with an image enhancement programme to project the Institution both nationally and globally.

For this purpose, an IEI Centenary Fund has been established and the finances accrued by way of donation/sponsorship would be utilized to organize various events in the Centenary Year.

The contribution made under this section is exempted as per Section 80G of the Income Tax Act 1961, if made by cheque/draft/NEFT.

Details of IEI Centenary Fund are as follows.

Name of the Fund	IEI Centenary Fund
Bank	HDFC Bank
A/c No	50100301303426
IFSC Code	HDFC0000469

The Institution of Engineers (India)

Notification for

R&D Grant-in-Aid (2019-20)

To promote appropriate technology, assist in building up design & research talents and, most importantly, to help in nurturing potential R&D venture amongst engineering students pursuing Diploma/UG/PG/PhD courses, The Institution of Engineers (India) had instituted the R&D Grant-in-Aid program way back in 2001.

Like every year, the Institution invites applications for the session 2019-2020 for funding R&D projects and research initiatives aimed at improving the life-style of common people from engineering students pursuing full time Diploma/UG/PG/PhD engineering program in AICTE/UGC/NAAC approved Institutions/Colleges/Universities. The application form and guidelines are available in our website https://www.ieindia.org. The projects should be carried out under the guidance of faculty members who are Corporate Members of IEI. Membership criteria for student(s), guide(s) and Institution(s) are as follows:

Project Category	Student/Applicant Membership	Guide(s) Membership	Institutional Membership
1. Diploma	Exempted [Membership of Student Chapter is desirable]	AMIE/MIE/FIE	Not Mandatory
2. UG (BE/BTech/AMIE/Equivalent)	'Student Member' (SMIE)	AMIE/MIE/FIE	Applicant's Institute should preferably be an Institutional Member with NBA / NAAC Accreditation or valid NIRF Rank
3. PG (ME/MTech/Equivalent)	AMIE/MIE/FIE	MIE/FIE	Applicant's Institute should preferably be an Institutional Member with NBA / NAAC Accreditation or valid NIRF Rank
4. PhD	AMIE/MIE/FIE	MIE/FIE	Applicant's Institute should preferably be an Institutional Member with NBA / NAAC Accreditation or valid NIRF Rank

The soft copy of the duly filled-up applications (in editable format), as per the proforma available in our website www.ieindia.org, should be sent through email to research@ieindia.org and one printed copy of the same should reach the following address:

Director (Technical)
The Institution of Engineers (India), 8 Gokhale Road, Kolkata 700 020

Applications received in format other than that available on our website will not be accepted. Application should be forwarded through the Guide, Head of the Department or Head of the Institution. Please note that preference will be given to project proposals received from Institutions who are members of The Institution of Engineers (India) and with NBA / NAAC Accreditation or valid NIRF Rank. Kindly go through the guidelines (visit link https://www.ieindia.org/webui/IEI-Activities.aspx#RnD-Initiative) carefully before filling up the application.

The grant is not intended for the faculty members who have access to other avenues of research funding. Proposals received will be scrutinized and the recipients of R&D Grant will be informed accordingly.

Annual Technical Volumes of IEI are available online

[https://www.ieindia.org/webui/IEI-Publication.aspx#annual-technical-volume]

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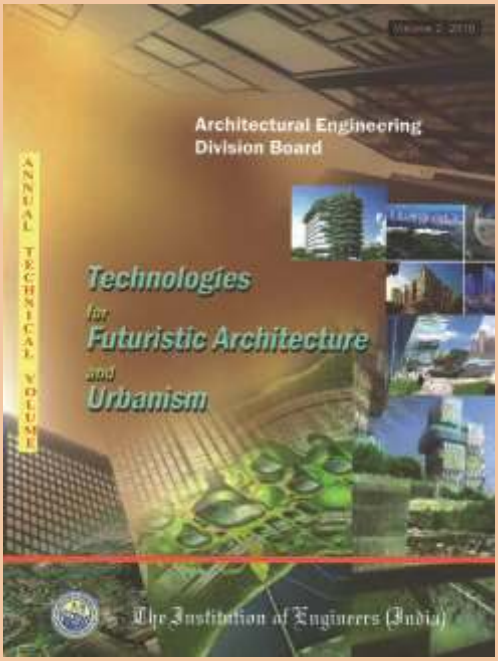

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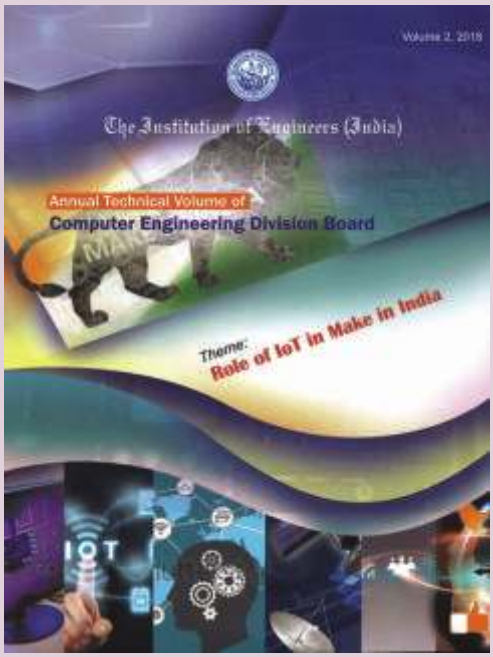

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