NATIONAL CONFERENCE
ON
Recent Technology In Engineering & Management
(RTEM-2020)

16TH TO 18TH NOVEMBER 2020

Organized by:

DEPARTMENT OF MECHANICAL ENGINEERING

RAAJDHANI ENGINEERING COLLEGE
BHUBANESWAR

Near Mancheswar Railway Station
P.O- Mancheswar Railway Colony
Bhubaneswar-751017(Orissa)
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NATIONAL CONFERENCE

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DEPARTMENT OF **MECHANICAL ENGINEERING**

Raajdhani Engineering College

Bhubaneswar

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Message

CA.B. Ramprasad Rao,
Chairman

Raajdhani Engineering College
Bhubaneswar.

I am glad to know that Department of MECHANICAL of Raajdhani Engineering College is organizing a National Conference on **"RECENT TECHNOLOGY IN ENGINEERING & MANAGEMENT"** on 16th to17th November 2020 in our college.

Number of experts, delegates, academician and students are participating in the workshop and will deliberately on the topic to cope up with the technological interactions among academicians, industries and research communities. I hope that the delegates and participants will be greatly benefitted from the Conference.

My best wishes for grand success of the National Conference CCFM

CA.B. Ramprasad Rao

Message

Mr. Manoj Kumar Palo,
Vice Chairman

Raajdhani Engineering College
Bhubaneswar.

I am happy to know that Department of MECHANICAL of Raajdhani Engineering College is organizing a National Conference on **"RECENT TECHNOLOGY IN ENGINEERING & MANAGEMENT"** on 16th to18th November 2020 in our college

I wish the National Conference CCFM grand success.

Mr. Manoj Kumar Palo

Message

Prof. (Dr.)S.C. Panda,
Secretary

Raajdhani Engineering College
Bhubaneswar.

I am glad to know that Department of MECHANICAL of Raajdhani Engineering College is organizing a National Conference on **"RECENT TECHNOLOGY IN ENGINEERING & MANAGEMENT"** on 16th to18th November 2020 in our college.

I hope this workshop would provide a platform to the faculty members, research scholars, delegates and all the stakeholders an opportunity to interact and creating self awareness on electrical designs.

I wish all the success of the National Conference CCFM

Prof. (Dr.)Sarad Chandra Panda

Message

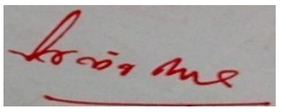
Prof. G.S.Mishra,
Director(T&P)

Raajdhani Engineering College
Bhubaneswar.

It gives me immense pleasure that the Department of MECHANICAL of Raajdhani Engineering College is organizing a National Conference on **"RECENT TECHNOLOGY IN ENGINEERING & MANAGEMENT"** on 16th to18th November 2020 in our college.

This Conference will go a long way in expressing the overview of electrical designs and highlights the issues & challenges faced by the industry in today's economic scenario.

I extend my warm greetings to all delegates and participants in this National Conference and wish the National Conference CCFM a grand success.



Prof. Gouri Shankar Mishra

Message

Prof. Ramesh Chandra Choudhury,
Director (Administration) Raajdhani
Engineering College Bhubaneswar.

I am glad to know that Department of MECHANICAL of Raajdhani Engineering College is organizing a National Conference on **"RECENT TECHNOLOGY IN ENGINEERING & MANAGEMENT"** on 16th to18th November 2020 in our college.

I believe the outcome of such kind of Conference shall help the future technology change in the field of CIVIL manufacturing & designs.

I wish all the success of the National Conference CCFM

Prof. Ramesh Choudhury

Message

Prof. (Dr.) Bimal Sarangi

Principal
Raajdhani Engineering College,
Bhubaneswar.

It gives me immense pleasure that Department of MECHANICAL of Raajdhani Engineering College is organizing a National Conference on **"RECENT TECHNOLOGY IN ENGINEERING & MANAGEMENT"** on 16th to18th November 2020 in our college & to publish its proceedings on this occasion. I believe, the Conference will largely benefit the faculty members, research Scholar,& all the stack holders who are involved in it.

I wish the National Conference CCFM all success.

Prof. (Dr.) Bimal Sarangi

CONTENTS

16	Hydrocarbon Refrigerant mixtures as an alternative to R134a in Domestic Refrigeration system: The state-of-the-art review	Manoj Kumar Pattanaik	16
17	Influence of Process Parameters of Single Point incremental Deep Drawing Process for Truncated Pyramidal Cups from 304 Stainless Steel using FEA	Krushnapriya Mohapatra	17
18	Experimental Analysis of TIG Welding and Comparison between Activated-TIG and TIG on Duplex Stainless Steel	Maheswar Sahoo	18
19	Influence of Ethylene Glycol and Water Mixture Ratio on Al2O3 Nanofluid Turbulent Forced Convection Heat Transfer	Malay Kumar Mishra	19
20	Influence of Friction Stir Welding Parameters on Properties of AL-7075 Alloy	Ashok Kumar	20
21	Influence of Process Parameters on The Thermal Performance of A Single Loop Pulsating Heat Pipe - An Experimental Study	Kailash Mohapatra	21
22	A review on flood management technologies related to image processing and machine learning	DEEPAK PANDEY	22
23	An experiential learning context for a serious game about local climate change.	PREMANANDA SAHU	23
24	Assessing the relative importance of psychological and demographic factors for predicting climate and environmental attitudes	RAJESH TRIPATHY	24
25	Climate adaptation, local institutions and rural livelihoods. In Adapting to Climate Change: Thresholds, Values, Governance.	PRADIP KUMAR LENKA	25
26	Estimating building cooling energy demand through the Cooling Degree Hours in a changing climate: A modeling study	SUDAM CHARAN SATAPTHY	26
27	Machine learning and artificial intelligence to aid climate change research and preparedness	SUMIT KUMAR MISHRA	27
28	Tackling Climate Change with Machine Learning	BANDANA BEHERA	28

29	Development and evaluation of a framework for global flood hazard mapping	MANOJ KUMAR TRIPATHY	29
30	Flood areas detection based on UAV surveillance system	NIRANJAN SAHOO	30
31	Calibration and validation of watershed models and advances in uncertainty analysis in TMDL studies	RAKESH BISWAL	31
32	Flood Risk Assessment of Global Watersheds Based on Multiple Machine Learning Models	CHINMAYA PARIDA	32
33	Heavy rainfall forecasting model using artificial neural network for the flood-prone area. In IT Convergence and Security	SUBHRANSHU SEKHAR TRIPATHY	33
34	Spatial prediction of flood potential using new ensembles of bivariate statistics and artificial intelligence	SUNAYANA MOHAPATRA	34
35	Image Processing-based Flood Detection for Online Flood Early Warning System	SHAIK RIAZUR RAHEMAN	35
36	Urban flood risk mapping using the GARP and QUEST models: A comparative study of machine learning techniques	BHASKAR KUMAR SAMANTARAY	36
37	Machine learning for geographically differentiated climate change mitigation in urban areas	ANTARYAMI SAHOO	37
38	A Research Paper on the Performance of Synthetic Fibre Reinforced Concrete	Binapani Mohapatra	38
39	Fiber Reinforced Concrete (FRC) for High Rise Construction	Saruk Mallick	39
40	Study of Geopolymer Concrete-A Cementless Concrete and its Durability	Shradhanjali Moharana	40
41	Developing Geopolymer Concrete Properties by Using Nanomaterials and Steel Fiber	Kumar Pani	41
42	Simulation of the Bluetooth Inquiry Process for Application in Transportation Engineering	Monalika Mohanty	42

43	Recent Management Strategies for Municipal Solid Wastes	Debashisha Sahoo	43
44	Programs Management and Integrated Product/Process Development in High Technology Industries	Subhralina Singh	44
45	Responsible Research and Innovation in Engineering and Technology Management: Concept, Metrics and Assessment	Bandana Acharya	45
46	Survey and Introduction to the Focused Section on Mechatronics for Sustainable and Resilient Civil Infrastructure	Jharana Pradhan	46
47	Investigation on Properties of Steel Fibre Reinforced Concrete	Akash Ranjan Mohanty	47
48	Effects of Vertical Component of Earthquakes on Cable-Stayed Bridges	Rukmini Sahoo	48
49	Application of Optical Fiber Sensors for Crack Monitoring in a Masonry Structure during Geotechnical Foundation Remediation	Kamalakanta Sen	49
50	Virtual graphic representation of construction equipment for developing a 3D earthwork BIM	Sikendar Sharma	50
51	FSK based on FRFT for Underwater Acoustic Communication	Prakash Kumar Behera	51
52	GPS and GSM based Rail Signaling and Tracking System	Jnana Ranjan Behera	52
53	Multi-level Coded Modulation Scheme for the Next Generation Optical Communication Systems	Ranjan Kumar Samantaray	53
54	An Efficient Association of A Mobile Client In Wireless Mesh Network	Soumya Mishra	54
55	PC to PC Data Transmission using Visible Light Communication	Sasmita Kumari Behera	55
56	Long-distance Underwater Laser Communication System with Photon-counting Receiver	Abhishek Das	56
57	Fingertip based heart beat monitoring system usingembedded systems	Madhusudan Das	57
58	Achievable Rate For A Mobile Molecular Communication System Invited Paper	Sambhunath Biswas	58
59	Innovation of mobile aaps markets:Anew subscription plan to study the consumer acceptance	Suvashree Dash	59

60	Collaboration of R&D plans for implementation of industry 4.0	Manisha Mohapatra	60
61	Research on the influence of technological innovation and implementation	Rashmi Ranjan Panigrahi	61
62	Production outsourcing and E-business adoption by Odisha Manufacturing firms	Sasmita Sahoo	62
63	Team intution and creativity in new product development project	Pratap Kumar Pati	63
64	power management strategiesn of distributed generation: A comprehensive review	Swadesh Ranjan Jena	64
65	power factor correction techniques in microgrids	Bimol Sinha	65
66	Energy management in microgrid: A review	Pradyumna Mallick	66
67	Performance of Solar photovoltaic using fuzzy logic	Smruti Ranjan Panda	67
68	Review of recent trends in optimization techniques for solar photovoltaic–wind based hybrid energy systems	Akshaya Kumar Kanungo	68
69	Power quality Improvement of grid connected solar energy system	Duradarsini Swain	69
70	power quality issues in grid integration of wind and photovoltaic energy conversion system	Shashi Bhusan Mohanty	70
71	Harmonic mitigation techniques in grid tied Solar Photovoltaic Systems	Rabi Narayan Chakrabarty	71
72	Current Li-Ion Battery Technologies in Electric Vehicles and Opportunities for Advancements	Sandip Das	72
73	Electric Vehicle Scenario in India:Aperspective	Rupak Kumar Mohanta	73
74	Analysis for STATCOM in Low and Medium Voltage Systems	Dipak Kumar Sahu	74
75	Optimized switching scheme of cascaded H-bridge multilevel inverter using GWO	Pravas Behera	75
76	Grid integration of a PV system using Salp Swarm Optimization	Uma Parida	76
77	HARMONIC mitigation techniques in modular multilevel inverter	Bharat Charan Sahoo	77
78	power quality Issues in distributed generation systems	Anirudha Samal	78
79	Power Quality Assessment of Distorted Distribution Networks	Truptimayee Nayak	79

Nano Fluids and Heat Transfer Enhancement a Review

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A nanofluid is a dilute liquid suspension of particles with at least one critical dimension smaller than ~100 nm. Research works so far suggest that nanofluids offer excellent heat transfer enhancement over conventional base fluids. The enhancement depends on several factors such as particle shape, particle size distribution, volume fraction of nanoparticles, temperature, pH, and thermal conductivities of nanoparticles and base fluids. This paper presents an updated review on nanofluids with the emphasis on heat transfer enhancement including formulation, physical properties such as thermal conductivity, rheological properties, and surface tesion, biological and non-biological applications, stability, possible mechanisms for the enhancement of heat conduction, and numerical modelling of nanofluids. Based on the research findings, a number of challenges are emphasized in order to understand the underlying physics for future industrial take-up of the nanofluids technology. Further computational studies are also required in order to understand all of the factors affecting on the enhancement of thermal conductivity of nanaofluids.

Keywords: *Heat transfer enhancement; Nanofluids; Thermal conductivity:Viscosity*

Influence of Temperature on Chemical Kinetics of Rubber Seed Oil Acid Esterification

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Abstract— Rubber seed oil is a potential source for biodiesel production due to its abundance. Since rubber seed oil have high acid value, direct conversion of oil to biodiesel is not possible and acid esterification has to be carried before base transesterification.The current work focusses on the kinetic study of this process, studying the temperature dependence of the process by fitting the same to an Arrhenius equation. The kinetics of the esterification of free fatty acids in rubber seed oil with methanol in the presence of sulphuric acid (5% v/v of oil concentration) as catalyst and methanol/fatty acid mole ratio 4:1 was studied for a temperature range of 30 0 C - 60 0 C.The reaction rate constants, the activation energy and pre- exponential factor were found out experimentally. The experimental results were found to fit a first-order kinetic law for the forward reaction and a second-order one for the reverse reaction.

Keywords: *Acid Esterification; Acid Value; Activation Energy; Chemical Kineticsl*

Numerical Analysis On The Effect Of Heat Transfer Rate By Varying The Tube Arrays In A Cross-Flow Heat Exchanger

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Abstract- Enhancement of heat transfer rate is the major requirement in a heat exchanger. Cross flow heat exchangers are the one which can give greater enhancement in the heat transfer rate and are also known for compactness. The present paper focuses on the increasing effect of the inner tube array on the overall heat transfer rate in a cross flow heat exchanger. A numerical analysis using Autodesk CFD is carried out with two different tube arrays in the exchanger. From the analysis it is found that with the increase in tube array the overall heat transfer rate has increased. Usage of the higher size of tube array have proved that the overall heat exchange has been improved.

Keywords : *Heat transfer enhancement;Cross flow heat exchanger; tube array;overall heat transfer rate;numerical analysis; compactness; Auto desk CFD*

3D Numerical Simulation of 'Herringbone' Defective Ribbon formation in planar flow melts spinning process

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ABSTRACT— The Puddle region where the molten metal is held by surface tension in the gap between nozzle and wheel is subjected to motion at the meniscus, which can lead to thickness variations that appears as casting lines or marks along the width of the ribbon. Many types of defects may be present on the surface of melt spun ribbon which include dimples, herringbone, waves, striations, etc. The wavy feature spanning the width of the ribbon which appeared periodically is discussed using 3D Numerical simulations. 3D Wheel along with the air domain is considered as the computational domains. VOF, energy and momentum equations are solved in the numerical simulation of two phase flow in the domains. Consistent with experimental observations, Herringbone formation is observed on the ribbon surface during 3D numerical simulations attributed to the pinning of Upstream meniscus of the puddle to the nozzle slit edge.

Keywords : *Planar Flow Melt Spinning, Herringbone defect, cross wave defect, Volume Of Fluid, pinning, Puddle, Meniscus,*

On The Evaluation of Best Fit Hyper-Elastic Model for Sandwich Beam with SB Rubber Core

Raj Kumar Bharati
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Abstract— The response of the system to the subjected to disturbing loads and vibrations can be controlled in many ways depending on weather active or passive vibration control. If the structure happens to be stiff enough then it would compensate for all vibration levels as its fundamental frequency is generally considered high. In the present scenario structures tend to be as light as, can be achieved at the expense of necessary lowering of stiffness even more than the mass is reduced, so that resonance frequencies often emerge where excitation frequencies are high. Layered composite beams that contain a damping core has been widely used in automotive and aerospace and even house hold electronic equipment to reduce the vibration effect. Analytical and numerical calculations on sandwich beams are cumber some. Therefore FEA software is widely used to solve the problems. An attempt is made to model three layered sandwiched beam with a rubber core exhibiting hyperelastic behaviour for which static and dynamic characteristics were found out,through which the most effective mathematical model is evolved at.

Keywords : *Hyper elasticity, strain rate, modeshapes, non linearity, composites, static, transient, Mooney 3parameter, Ogden 1st order, Polynomial 2nd order, Arruda Boyce.*

DOE Analysis Applied for Enzymatic Transesterification of High FFA Rubber Seed Oil

Gopal Krushna Sahu
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Abstract— Biodiesel production from non-edible oils with high free fatty acid content using biocatalyst was investigated in the present study. Pancreatic Lipase in the form of free powder was used as catalyst for the transesterification of rubber seed oil. The effect of reaction parameters such as catalyst concentration, water concentration and oil to acyl acceptor molar ratio were studied. The experiments were designed and analyzed using the statistical method Design of Experiments. The analysis shows that water concentration has significant effect on percentage of biodiesel conversion from vegetable oil.

Keywords : *biodiesel; enzymatic transesterification;pancreatic lipase; rubber seed oil;high free fatty acid*

Analysis of Tool Wear in End Milling of AISI 1018 Steel

Dambarudhar Das
Department of Mechanical Engineering, Raajdhani Engineering College Bhubaneswar

Abstract— Tool wear increases cutting force, vibration and temperature in end milling and reduces surface finish of machined work piece. In this paper, a statistical model has been developed to predict the tool wear in terms of machining parameters such as spindle speed, feed rate and depth of cut. The experiments were conducted on AISI 1018 steel by high speed steel end mill cutter and tool wear was measured using tool maker's microscope. This paper studies the application of taguchi design to optimize tool wear in end milling. The direct and interaction effect of the machining parameters with tool wear were analyzed, which helped to select process parameters in order to reduce tool wear which ensured quality of milling.

Keywords : *AISI 1018 steel; Milling;Taguchi design;Tool maker's microscope; Tool wear*

Experimental Investigations on Mechanical behavior of Al2O3 and Graphite Reinforced Aluminium Hybrid Metal Composites by Stir Casting Process

Ratnamanjari Das
Department of Mechanical Engineering, Raajdhani Engineering College Bhubaneswar

Abstract—Al_2O_3 and Graphite particulates using liquid metallurgy route in particular stir casting technique. The addition of reinforcement graphite is maintained 3% as constant and the alumina is varied as 6%, 9% and 12%. For each composite, reinforcement particles were preheated to a temperature of 200° and then dispersed in steps of three into the vortex of molten 6063 Al alloy to improve wettability and distribution. Micro-structural characterization was carried out for the above prepared composites by taking specimens from central portion of the casting to ensure homogeneous distribution of particles. Hardness, tensile and microstructure of the prepared composite were determined before and after addition of Al_2O_3 and Graphite particulates. Micro-structural characterization of the composites has revealed fairly uniform distribution and some amount of grain refinement inthe specimens. Further, the hardness, tensile strength properties are higher in case of composites when compared to unreinforce6063 Al matrix. Tensile strength of 12 wt % of Al_2O_3 composite got maximum value is 79.335 mpa. The optical micrographs of 9 wt % of Al_2O_3 composite produced by stir casting method shows fairly uniform distribution of Al_2O_3 particulates in the 6063 Al metal matrix, when compared to the 6 wt % of Al_2O_3 and 12 wt % of Al_2O_3. The Vickers hardness of 12wt % of Al_2O_3 is 49.5HV higher than that ofthe 6wt % of Al_2O_3 is 40.6 HV and 9wt % of Al_2O_3 is 46.1HV .

Keywords ;*Al 6063;Al_2O_3 Particulates; Hybrid metal composites;Stir-Casting; Mechanical properties*

A Case Study on Modifications made in Traditional Indian Biomass Cook stove to Increase its Thermal Efficiency

Abinash Panda
Department of Mechanical Engineering, Raajdhani Engineering College Bhubaneswar

Abstract: The need for an energy efficient biomass cookstove which can replace household LPG stoves is eminent in today's energy crisis scenario. Hence the utilization of biomass energy in the form of pellets (sawdust, garden waste, etc.) can be used as a fuel to run the cooking stove to replace conventional fuels (LPG).The previous cookstoves manufactured by various industries in India were less energy efficient.The main objective behind this case study is to modify these stoves in such a way that they would be more energy efficient, less harmful to living beings as well as user friendly. Due to lack of technology and awareness regarding biomass and its derivatives, this field has not been researched upto its true potential. The biomass pellets are ignited, which thereafter undergo gasification process and are used as a fuel in these biomass cook stoves. The thermal efficiency of these stoves is obtained by performing water boiling test (as per BIS). Therefore, the challenge in this field is not only to develop such stoves but they should also be technologically feasible, environmentally sustainable, economically viable and socially acceptable

Keywords: *Energy efficient; biomass; cookstove; pellets; gasification; thermal efficiency;water boiling test*

Experimental investigation of Machining Parameters for Electrical Discharge Machining on Al-6061

Subhashree Pothal
Department of Mechanical Engineering, Raajdhani Engineering College Bhubaneswar

ABSTRACT :Metal matrix composites, in particular, Aluminium Matrix Composites are gaining increasing attention for applications in aerospace, defence and automobile industries. The use of nonconventional machining techniques in shaping aluminum metal matrix composites has generated considerable interest as the manufacturing of complicated contours such as dies. Electrical discharge machining (EDM) appears to be a promising technique for machining metal matrix composites. The objective of this work is to investigate the effect of parameters like Current(I), Pulse on time(T), Voltage(V) and Flushing pressure(P) on metal removal rate (MRR),tool wear rate(TWR) as well as surface roughness(SR) on the machining of hybrid Al6061 metal matrix composites reinforced with 10% SiC and 4%graphite particles. Composite was fabricated using stir casting process. A central composite rotatable design was selected for conducting experiments. Mathematical models were developed using the MINITAB R14 software. The method of least squares technique was used to calculate the regression coefficients and Analysis of Variance (ANOVA) technique was used to check the significance of the models developed. Scanning Electron Microscope (SEM) analysis was done to study the surface characteristics of the machined specimens and correlated with the models developed.

KEYWORDS;*Electrical discharge machining; Metal matrix composites; Response surface method; Hybrid composites; Aluminium composites;stir casting process.*

Investigation on Influence of drilling parameters on Thrust force and Torque - Based on Design of Experiments

Samarendra Kumar Nayak
Department of Mechanical Engineering, Raajdhani Engineering College Bhubaneswar

Abstract— Drilling, a hole producing process is especially important because it accounts for a large portion of overall machining operations. Amongst all machining operations, drilling using twist drill is the most commonly applied method for generating holes for riveting and fastening structural assemblies. It is well known that the drill point geometry has a significant effect of the thrust force of a twist drill. The present research initiative in an attempt to investigate the relative significance of the drilling parameters such as point angle, spindle speed, feed rate and drill diameter on the thrust force and torque using Taguchi design method. Drilling operations have been conducted over a wide a range of cutting condition. Spindle speed varied in the range 350 rpm to 750 rpm in 3steps, Feed rate varied from 0.3 to 0.6mm /rev in 3 steps. HSS-R (DIN 338) two flutes uncoated conventional twist drills of 3 different diameters (8, 10 and 12mm) with 1180 point and 450 helix angles. Drill bits tool geometry altered by tool&cutter grinder and obtained 1100 , 1000 point angles without changing helix angle. Drilling was performed on rectangular bars of Alluminium 7075, 2014 and 6061 alloy work pieces of size 300mmx50mmx10mm with dry condition as per taguchi L27 orthogonal array. A kistler (type 9272), four components (FX,FY,FZ and MZ) dynamometer was used and the signal was processed by a type 5070 multichannel signal amplifier unit (Kistler 5070 type) was used to record the thrust force and torque. Finally, confirmation test has been carried to compare the predicted values with the experimental values to confirm its influence of parameters on thrust force and torque.

Keywords— *Drilling; Alluminium alloys; Thrust Force; Torque; Taguchi-Design of Experiments*

Kinematic analysis of a SCARA robot for deburring of rectangular paths

Ratikanta Sahoo
Department of Mechanical Engineering, Raajdhani Engineering College Bhubaneswar

Abstract—This paper presents a procedure for assessing the vibration analysis of type SCARA robots. The motion and running conditions of such robots are very complicated that leads to produce vibration and shock which are generated by arm profile in running conditions. In this study the vibration analysis gives the feasibility of the preview control was examined to improve the performance of the SCARA robots system. As it is important for containment the robot arm trajectories generated by the model to show satisfactory safe performance under vibration occurrence phenomena so that they completely avoid errors, the results obtained from such vibration analysis assessment procedure are considered to be valuable and reliable process not only with respect to vibration risk assessment but also for predicting kinematic analysis by investigating the robot arm motion using the kinematic and vibration methods. Forced vibrations is studied analytically help the designer to predict the behavior and design the robot hardware or control system. Theoretical results show reduction in both vibration amplitude and time history response.

Keywords—*SCARA robot;Vibration analysis;Modeling;Control kinematic analysis*

Experimental Study on Temperature Evolution during Friction Stir Welding of 2014-T6 Aluminum alloy, Structure-Property Correlation

Krushna Mohan Mohapatra
Department of Mechanical Engineering, Raajdhani Engineering College Bhubaneswar

Abstract:- This study aims to measure the temperature at a location very near to the stir zone during friction stir welding of 6mm thickness 2014-T6 Aluminum alloy under different process parameters like weld speed, tool pin profile of varying concave shoulder radius of R3 & R3.5 at constant tool rotational speed. Thermo couple of K-type is inserted in the pre-grooved hole of 2.5mm diameter on the advancing side of the work piece at a distance of 6mm from the centre line of the two plates to be joined. The location is selected such that, it is at exactly half the length of the work piece. The welded joints were made such that they are free of internal defects. Temperature was measured using the thermo couple during FSW at specified location on the work piece in the welding direction. To study the effect of tool pin profile, temperature measurements were made in the region adjacent to the rotating pin, close to the nugget in the thermo mechanical affected zone (TMAZ). Experimental results shows that by increasing the tool rotation speed, temperature rises to a maximum using concave shoulder radius of R2.5 mm, due to larger contact area increasing the heat input required for sufficient plasticized deformation thus improving the mechanical properties. It is observed that during FSW extensive deformation is experienced at the nugget zone and the evolved microstructure strongly influences the mechanical properties of the joints. The present study also aims at understanding the influence of pin profile on the micro structural changes and the associated mechanical properties.

Keywords: *Friction Stir Welding; microstructure; temperature; mechanical properties*

Extraction of fuel from waste plastics and performance analysis in a CI Engine

Bimal Sarangi
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Abstract-The present work involves the synthesis of a petroleum-based fuel by the catalytic pyrolysis of waste plastics. Catalytic pyrolysis involves the degradation of the polymeric materials by heating them in the absence of oxygen and in the presence of a catalyst. In the present study different oil samples are produced using different catalysts under different reaction conditions from waste plastics. The synthesized oil samples are subjected to a parametric study based on the oil yield, selectivity of the oil, fuel properties, and reaction temperature. Depending on the results from the above study, an optimization of the catalyst and reaction conditions was done. Gas chromatography-mass spectrometry of the selected optimized sample was done to find out its chemical composition. Finally, performance analysis of the selected oil sample was carried out on a compression ignition (CI) engine. Polythene bags are selected as the source of waste plastics. The catalysts used for the study include silica, alumina, Y zeolite, barium carbonate, zeolite, and their combinations. The pyrolysis reaction was carried at polymer to catalyst ratio of 10: 1. The reaction temperature ranges between 400° C and 550° C. The inert atmosphere for the pyrolysis was provided by using nitrogen as a carrier gas.

Key Words: Pyrolysis, Extraction of fuel, CI Engine, Synthesis, Plastics, Catalysts, Nitrogen.

Temperature Field Dependent Variation Computational Method for Non-Fourier Heat Conduction in Thin Film Semiconductor

Sashikant Kanta Acharya
Department of Mechanical Engineering, Raajdhani Engineering College Bhubaneswar

Abstract— In recent years, the Dual Phase Lag (DPL) heat conduction equation proved itself to be one of the best choices for predicting both observed micro scale and macro scale effects in the case of non-Fourier heat conduction in the micro/nano-scaled semiconductor devices and structures. In this publication, based on the Flow field Dependent Variation (FDV) methodology, we present a unique finite differenced Temperature field Dependent Variation Computational Method for characterizing and resolving the one dimensional DPL heat conduction equation for Silicon thin film resembling a micro-electronic structure subjected to a suddenly applied spatial temperature gradient at both the boundary ends. The uniqueness of this computational method is that at every time step, the matrix coefficients of finite differenced governing partial differential equation (PDE) based on FDV theory will change as the local adjacent spatial and temporal Temperature field changes and will correspondingly modify the governing PDE to solve the appropriate physics that are going on at each grid points. This work initiates the development of such local temperature based computational strategies for the numerical simulation of non-Fourier DPL heat conduction that will facilitate the optimized thermal stability and design of miniature transistors and circuits in the semiconductor industry

Key Words:*FDV theory; DPL model, non-Fourier; Heat waves, micro/nano heat transfer; Microelectronic devices, MOSFET.*

Hydrocarbon Refrigerant mixtures as an alternative to R134a in Domestic Refrigeration system: The state-of-the-art review

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Abstract-The objective of this paper is to present review on the alternative refrigerants used in the domestic refrigerators to have better performance with minimum losses. This paper give the summary and range of various refrigerants used in the domestic refrigerators. of global warming which affect the environment by the use of refrigerant, and our aim is to reduce the effect of global warming as well as optimize the performance of domestic refrigerators by using the latest refrigerants. This review paper represents the recent developments done in domestic refrigerator. Performance of refrigerator is increased by using different refrigerants. R134a is used in domestic refrigeration and other vapor compression system. R134a is having zero ozone depletion potential (ODP) and almost good thermodynamic properties, but it has a high Global Warming Potential (GWP) of 1300.The higher GWP due to R134a emissions from domestic refrigerators leads to identifying a long term alternative to meet the requirements of system performance, Therefore it is going to be banned very soon for environmental safety. Some new refrigerants is been found by researchers which are environmental friendly refrigerants having low GWP and low ODP. Hydrocarbon refrigerants particularly propane, butane and isobutene are proposed as an environment friendly refrigerants. After reviewing the various literatures on the hydrocarbons (R290 and R600a) refrigerants and their mixture gives goodperformance in small capacity domestic refrigerator to replace R134a.

Keywords: *Hydro fluorocarbon refrigerant;GWP; ODP; Alternative refrigerants; Hydrocarbon refrigerants; Propane (R290); Isobutene (R600a).*

Influence of Process Parameters of Single Point incremental Deep Drawing Process for Truncated Pyramidal Cups from 304 Stainless Steel using FEA

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Abstract— For 304 stainless steel sheet, the single point incremental deep drawing process has been simulated using finite element analysis software code and Taguchi experimental planning. The process parameters are blank thickness, step depth, tool radius and coefficient of friction for the truncated pyramidal cups. It has been found that the step depth and tool radius are highly influential in controlling the formability of cups.

Keywords: *single point incremental deep drawing process;304 stainless steel ; truncated pyramidal cups; blank thickness;tool radius, step depth; coefficient of friction.*

Experimental Analysis of TIG Welding and Comparison between Activated-TIG and TIG on Duplex Stainless Steel

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Abstract— In this study the welding process was conducted using the TIG (Tungsten Inert Gas) welding technique. TIG is used very commonly in areas, such as rail car manufacturing, automotive and chemical industries.Duplex Stainless steel (2205) is extensively used in industries as an important material, because of its excellent corrosion resistance, higher yield strength and hardness. In the present paper an attempt is made to understand the effect of tungsten inert gas welding by varying input process parameters such as gas flow rate , welding speed and welding current, that are influences on mechanical properties such as strength of weld joint, microstructure and hardness by using taguchi technique (L9 orthogonal array). The experimental analysis has been studied to produce better weld quality and higher productivity and comparison of Activated TIG welding with TIG welding.Activated TIG welding can increase the joint penetration. SiO2 is used as a flux in this work and comparing weld joint penetration and weld depth towidth ratio. By using best clamping method, the angular distortion of weld plates has been avoided.

Keywords:*Welding, Duplex Stainless Steel; microstructure; Taguchi technique, hardness; Tungsten Inert Gas Welding; Tensilestrength.*

Influence of Ethylene Glycol and Water Mixture Ratio on Al2O3 Nanofluid Turbulent Forced Convection Heat Transfer

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Abstract: In this present study, a numerical analysis is developed to evaluate the base fluid and mixture ratios influencing on the heat transfer coefficient and flow characteristics of nanofluids in the turbulent range of Reynolds number employing in the investigation. This analysis formulated with the help of Eddy diffusivity equation of Van Driest. The properties of Aluminum dioxide (Al_2O_3) nanofluid with a low fluid Ethylene Glycol (EG) -Water (W) mixture of 60:40 ratio is employed in a wide range of concentrations of 0.5% to 2% on a bulk temperature range of 20^{o}C to 90^{o}C.The influences of density and temperature effect on heat transfer coefficients are determined. The maximum concentrations for which the heat transfer enhancement can attain are estimated to be 1.5% and 2.0% at 30^{o}C and 80^{o}C respectively under turbulent range. The temperature effect and concentration ratios are influencing on a heat transfer coefficient of nanofluids were analyzed and observed that the heat transfer coefficients enhances with concentration and decreases with temperature.

Keywords:*Aluminum dioxide; ethylene glycol; Nanofluids;properties of nanofluids and turbulent region*

Influence of Friction Stir Welding Parameters on Properties of AL-7075 Alloy

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Abstract -Friction Stir Welding (FSW) is a solid-state welding process used for welding similar and dissimilar materials. FSW is especially suitable to join Al alloys sheets, and this technique allows different material couples to be welded continuously. In this study dissimilar joints between aluminum alloy (AA5454) and aluminum alloy (AA7075) produced by friction stir welding, to optimize these parameters and determine which of them is significant by using Taguchi L16 optimization method. Seven parameters at two levels were selected in this study. The selected parameters are tool rotational speed, traverse speed, pin profile (based on taper angle), the ratio between shoulder diameter (D) and pin diameter (d) (D/d ratio), tool tilt angle, plunge depth, and base metal location (weld location)). The ultimate tensile strength (UTS) and ductility are considered as the mechanical properties of the dissimilar joints. Then, mathematical models are built for ultimate tensile strength and ductility as a function of significant parameters/interactions using response surface methodology. In addition, the microstructures of the optimum joint and the weakest joint are studied using optical microscopy. The results of this work showed that the rotational speed, traverse speed, D/d ratio and plunge depth are significant parameters in determining UTS (mean, signal to noise ratio (S/N)) at different confidence levels, but pin profile, location of base metal and tool tilt angle are insignificant parameters at any confidence levels. The traverse speed has the highest contribution to the process for UTS about 18.5% and 16.9% for S/N ratio and mean, respectively. The accuracy of the models according to the UTS is 97.6% and 99.5% for mean and S/N ratio, respectively. The maximum joint efficiency, compared to the strength of the AA5454, is 85.3%.

Keywords ; *Friction stir welding;Taguchi method;Dissimilar metals;Tensile strength;Ductility*

Influence of Process Parameters on The Thermal Performance of A Single Loop Pulsating Heat Pipe - An Experimental Study

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Abstract— The continuous demand for smaller and faster micro electronics systems has increased the need for development of more efficient cooling systems. In that direction, development of Heat pipes is proved to be a promising cooling technology for microelectronic systems for the removal of high local heat flux rates and to achieve uniform chip temperatures. The counter current flow between the liquid and vapor phases causes significant entrainment losses in conventional heat pipes and the limitations in conventional heat pipes have led to the development of pulsating heat pipes. The heat transfer mechanism in a PHP is a complex phenomena as it is influenced by multiple factors and no single author could present a comprehensive heat transfer study even as on today. Moreover, the open literature available on single loop PHPs is very limited and hence an attempt is made to verify the influence of diverse process parameters on the flow and heat transfer behavior of a PHP. In the present work, an experimental setup has been built in and conducted experiments in order to understand the behavior of fluid flow and heat transfer characteristics of a single loop PHP without evacuation conditions. The setup is provided with air cooling arrangement at the condenser. The preliminary results highlighting the effect of heat input, working fluid and orientation have been obtained from this experiment. The results highlighted that the PHP yields better fluid flow and heat transfer characteristics in horizontal mode rather its operation in vertical mode. Among all the working fluids considered for PHP operation, Acetone exhibits better transfer characteristics.

Keywords; Electronics *cooling; single loop pulsating heat pipe (PHP); Air cooling; Thermal Resistance; Heat transfer co-efficient*

A review on flood management technologies related to image processing and machine learning

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Abstract—Flood management, which involves flood prediction, detection, mapping, evacuation, and relief activities, can be improved via the adoption of state-of-the-art tools and technology. Focusing on ways to mitigate floods and provide a quick response after floods is critical to ensuring fatalities are minimized, along with reducing environmental and economic damages. In the literature, techniques from different domains including remote sensing, machine learning, image processing and data analysis have been explored to manage different tasks related to flood management. This study proposes a new framework that categorizes the recent research that has been conducted on flood management systems. The framework addresses the following significant research questions: (1) What are the major techniques deployed in flood management? (2) What are the phases of flood management which existing studies tend to focus on? (3) What are the systems that are proposed to tackle problems related to flood management? (4) What are the research gaps identified in the literature when it comes to deploying technology for flood management? A classification framework for flood management has been proposed to group the various technologies reviewed. Lack of hybrid models, which combine image processing and machine learning, for flood management was observed. In addition, the application of machine learning-based methods in the post-disaster scenario was found to be limited. Thus, future efforts need to focus on combining disaster management knowledge, image processing techniques and machine learning tools to ensure effective and holistic disaster management across all phases.

Keywords: Flood management, economic damages, evacuation, hybrid models, disaster management, image processing

An experiential learning context for a serious game about local climate change.

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Abstract—In this paper we discuss the theoretical, design and evaluative underpinnings of the experiential learning context central to the design processes of the Future Delta 2.0 serious game. The game is aimed at facilitating understanding and action on local climate change. We begin with a discussion of play as it relates to designing serious games. Then we articulate the experiential learning context revealed through three interconnected design strands: meaningful learning objectives -- how the learning is structured; situations -- where the learning takes place, geographically and culturally; learning through action -- how learning happens through play. We introduce the experiential learning context of Future Delta 2.0, a virtual 3D game. The game reaches across art, science and technology to communicate a community-based local vision of climate change challenges and solutions in Delta, British Columbia. Finally, we discuss the design, evaluation methods and analysis of the Future Delta 2.0 experiential learning context. Our conclusion is that the experiential learning context may contribute theoretically and practically to the research and design of 3D serious games.

Keywords: experiential learning, climate change, community-based, experiential learning context

Assessing the relative importance of psychological and demographic factors for predicting climate and environmental attitudes

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Abstract— In this paper, we seek to identify robust predictors of individuals' attitudes towards climate change and environmental degradation. While much of the extant literature has been devoted to the individual explanatory potential of individuals' characteristics, we focus on the extent to which these characteristics provide robust predictions of climate and environmental attitudes. Thereby, we adjudicate the relative predictive power of psychological and socio demographic characteristics, as well as the predictive power of combinations of these attributes. To do so, we use a popular machine learning technique, Random Forests, on three surveys fielded in China, Switzerland, and the USA, using a variety of outcome variables. We find that a psychological construct, the consideration of future consequences (CFC) scale, performs well in predicting attitudes, across all contexts and better than traditional explanations of climate attitudes, such as income and education. Given recent advances suggesting potential psychological barriers of behavioural change Public (Weaver, Adm Rev 75:806–816, 2015) and the use of psychological constructs to target persuasive messages (Abrahamse et al., J Environ Psychol 265–276, 2007; Hirsh et al., Psychol Sci 23:578–581, 2012), identifying important predictors, such as the CFC may allow to better understand public's appetite for climate and environmental policies and increase demand for these policies, in an area where existing efforts have shown to be lacking (Bernauer and McGrath, Nat Clim Chang 6:680–683, 2016; Chapman et al., Nat Clim Chang 7:850–852, 2017).

Keywords: climate change, explanatory potential, predictive power, psychological construct, climate attitudes

Climate adaptation, local institutions and rural livelihoods. In Adapting to Climate Change: Thresholds, Values, Governance.

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Abstract-Climate variability has been evident on the Mongolian plateau in recent decades. Livelihood adaptation to climate variability is important for local sustainable development. This paper applies an analytical framework focused on adaptation, institutions, and livelihoods to study climate adaptation in the Mongolian grasslands. A household survey was designed and implemented in each of three broad vegetation types in Mongolia and Inner Mongolia. The analytical results show that livelihood adaptation strategies of herders vary greatly across the border between Mongolia and Inner Mongolia, China. Local institutions played important roles in shaping and facilitating livelihood adaptation strategies of herders. Mobility and communal pooling were the two key categories of adaptation strategies in Mongolia, and they were shaped and facilitated by local communal institutions. Storage, livelihood diversification, and market exchange were the three key categories of adaptation strategies in Inner Mongolia, and they were mainly shaped and facilitated by local government and market institutions. Local institutions enhanced but also at times undermined adaptive capacity of herder communities in the two countries, but in different ways. Sedentary grazing has increased livelihood vulnerability of herders to climate variability and change. With grazing sedentarization, the purchase and storage of forage has become an important strategy of herders to adapt to the highly variable climate. The multilevel statistical models of forage purchasing behaviors show that the strategies of livestock management, household financial capital, environmental (i.e., precipitation and vegetation growth) variability, and the status of pasture degradation were the major determinants of this adaptation strategy.

Keywords: Climate adaptation, Local institutions, Rural livelihoods, Herder communities, Mongolian grasslands

Estimating building cooling energy demand through the Cooling Degree Hours in a changing climate: A modeling study

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Abstract—The increasingly hot and long summers due to the climate change will cause a significant increase in energy demand for cooling systems, especially in highly-densely populated regions. The cooling energy needs of buildings are proportional to the Cooling Degree Hours, which consist in the cumulative sum of the positive differences between the hourly outdoor temperature and the indoor comfort temperature. In this work, this quantity is computed using gridded temperatures predicted by the Weather Research and Forecasting model for the years 2000, 2019, 2050 and 2080 across Italy. This allows investigating the evolution of the cooling energy needs on a national scale, following the climate-change related trend of the ambient temperature. For climate projections, an intermediate (RCP4.5) and a high emissions (RCP8.5) scenario defined by the Intergovernmental Panel for Climate Change have been considered. Findings show that results of 2050-RCP8.5 and 2080-RCP4.5 are very close, both in terms of amount of operational hours and cooling degree hours. The maximum level of cooling degree hours has increased more in the recent past than it will grow in the future, even according to RCP8.5. Yet in 2080 about 70% of Italy will reach levels of cooling degree hours not touched in 2000.

Keywords: Climate change, Building cooling, Summer energy demand, WRF, Infographic maps, Mediterranean area

Machine learning and artificial intelligence to aid climate change research and preparedness

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Abstract-Climate change issues societal operation, likely wanting considerable adaptation to deal with doing well altered weather patterns. Machine learning (ML) algorithms have progressed considerably, triggering breakthroughs in some other investigation sectors, along with only lately suggested as helping climate evaluation. Though a significant volume of isolated Earth System functions are analyzed with ML techniques, much more generic phone system to find out better the whole temperature unit hasn't happened. For instance, ML is able to aid remote identification, in which complex feedbacks make characterization tough from instantaneous equation analysis or perhaps possibly visualization of sizes plus Earth System design (ESM) diagnostics. Artificial intelligence (AI) may thus build on determined climate associates to provide enhanced alerts of approaching eco-friendly functions, which includes intense events. While ESM development is actually completely necessary, a parallel concentrate on utilizing ML and AI to determine as well as capitalize a great deal more on pre pre-existing simulations as well as info is suggested by us.

Keywords: Climate, glacier retreat, mass balance, lakes, sea level

Tackling Climate Change with Machine Learning

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Abstract— Climate change is one of the greatest challenges facing humanity, and we, as machine learning (ML) experts, may wonder how we can help. Here we describe how ML can be a powerful tool in reducing greenhouse gas emissions and helping society adapt to a changing climate. From smart grids to disaster management, we identify high impact problems where existing gaps can be filled by ML, in collaboration with other fields. Our recommendations encompass exciting research questions as well as promising business opportunities. We call on the ML community to join the global effort against climate change.

Keywords—humanity, disaster,green house emission, smart grids, climate change

Climate Change Affect on Queensland Electricity Infrastructure into the Future

Development and evaluation of a framework for global flood hazard mapping

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Abstract— Nowadays, the development of high-resolution flood hazard models have become feasible at continental and global scale, and their application in developing countries and data-scarce regions can be extremely helpful to increase preparedness of population and reduce catastrophic impacts.

The present work describes the development of a novel procedure for global flood hazard mapping, based on the most recent advances in large scale flood modelling. We derive a long-term dataset of daily river discharges from the hydrological simulations of the Global Flood Awareness System (GloFAS). Streamflow data is downscaled on a high resolution river network and processed to provide the input for local flood inundation simulations, performed with a two-dimensional hydrodynamic model. All flood-prone areas identified along the river network are then merged to create continental flood hazard maps for different return periods at 30″ resolution. We evaluate the performance of our methodology in several river basins across the globe by comparing simulated flood maps with both official hazard maps and a mosaic of flooded areas detected from satellite images. The evaluation procedure also includes comparisons with the results of other large scale flood models. We further investigate the sensitivity of the flood modelling framework to several parameters and modelling approaches and identify strengths, limitations and possible improvements of the methodology.

Keywords: Global scale, Flood hazard, mapping2D , hydraulic model, GloFAS

Flood areas detection based on UAV surveillance system

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Abstract-In this paper we propose a methodology for detection, localization, segmentation and size evaluation of flood areas from aerial images which are taken with drones. The approach is based on sliding box method and texture features analyses. The process of feature selection takes into account a performance degree obtained from false positive and false negative cases. We combined different properties of the images like color, texture and fractal types. A class of flood and one of non-flood were established based on clustering properties of some features and a criterion of similarity is used to segment the flood zones. Finally, the evaluation of the flood size is proposed. The method was tested on 10 images of flood zones and a rate of accuracy of 98.87% was obtained.

Keywords: localization, sliding box, aerial images

Calibration and validation of watershed models and advances in uncertainty analysis in TMDL studies

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Abstract— Watershed models are widely used in total maximum daily load (TMDL) studies to predict the impacts of pollutant discharges on the biochemical functioning and assimilative capacity of water bodies. The reliability of a TMDL is therefore tightly linked with the predictive capability of these models. While there has been an increasing availability and application of watershed models for TMDL studies, guidelines for model evaluation, including recommendations for an appropriate selection and implementation of calibration, validation, and uncertainty analysis strategies, remain at present limited. The ASCE Environmental and Water Resources Institute (EWRI) TMDL Analysis and Modeling Task Committee was established in part to identify existing and emerging challenges encountered by water resources professionals during any phase of a TMDL development and to produce documentation to address these challenges. This paper reviews existing approaches for model calibration, validation, and uncertainty analysis, including recommendations to establish baseline modeling practices to obtain a satisfactory watershed model.

Keywords : TMDL studies, Environmental and Water Resources Institute (EWRI)

Flood Risk Assessment of Global Watersheds Based on Multiple Machine Learning Models

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Abstract: Machine learning algorithms are becoming more and more popular in natural disaster assessment. Although the technology has been tested in flood susceptibility analysis of several watersheds, research on global flood disaster risk assessment based on machine learning methods is still rare. Considering that the watershed is the basic unit of water management, the purpose of this study was to conduct a risk assessment of floods in the global fourth-level watersheds. Thirteen conditioning factors were selected, including: maximum daily precipitation, precipitation concentration degree, altitude, slope, relief degree of land surface, soil type, Manning coefficient, proportion of forest and shrubland, proportion of artificial surface, proportion of cropland, drainage density, population, and gross domestic product. Four machine learning algorithms were selected in this study: logistic regression, naive Bayes, AdaBoost, and random forest. The global susceptibility assessment model was constructed based on four machine learning algorithms, thirteen conditioning factors, and global flood inventories. The evaluation results of the model show that the random forest performed better in the test, and is an efficient and reliable tool in flood susceptibility assessment. Sensitivity analysis of the conditioning factors showed that precipitation concentration degree and Manning coefficient were the main factors affecting flood risk in the watersheds. The susceptibility map showed that fourth-level watersheds in the global high-risk area accounted for a large proportion of the total watersheds. With the increase of extreme hydrological events caused by climate change, global flood disasters are still one of the most threatening natural disasters. The global flood susceptibility map from this study can provide a reference for global flood management.

Keywords: machine learning; global fourth-level watersheds; flood susceptibility

Heavy rainfall forecasting model using artificial neural network for the flood-prone area. In IT Convergence and Security

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Abstract— Interest in monitoring severe weather events is cautiously increasing because of the numerous disasters that happen in the recent years in many world countries. Although to predict the trend of precipitation is a difficult task, there are many approaches exist using time series analysis and machine learning techniques to provide an alternative way to reduce impact of flood cause by heavy precipitation event. This study applied an Artificial Neural Network (ANN) for prediction of heavy precipitation on monthly basis. For this purpose, precipitation data from 1965 to 2015 from local meteorological stations were collected and used in the study. Different combinations of past precipitation values were produced as forecasting inputs to evaluate the effectiveness of ANN approximation. The performance of the ANN model is compared to statistical technique called Auto Regression Integrated Moving Average (ARIMA). The performance of each approaches is evaluated using root mean square error (RMSE) and correlation coefficient (R^2). The results indicate that ANN model is reliable in anticipating above the risky level of heavy precipitation events.

Keywords—computational intelligence time series forecasting, neural network,

Spatial prediction of flood potential using new ensembles of bivariate statistics and artificial intelligence

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Abstract— Flash-flood is considered to be one of the most destructive natural hazards in the world, which is difficult to accurately model and predict. The objective of the present research is to propose new ensembles of bivariate statistics and artificial intelligences and to introduce a comprehensive methodology for predicting flood susceptibility. The Putna river catchment of Romania is selected as a case study. In this regard, a total of six ensemble models were proposed and verified: Multilayer Perceptron neural network-Frequency Ratio (MLP-FR), Multilayer Perceptron neural network -Weights of Evidence (MLP-WOE), Rotation Forest-Frequency Ratio (RF-FR), Rotation Forest-Weights of Evidence (RF-WOE), Classification and Regression Tree-Frequency Ratio (CART-FR), and Classification and Regression Tree-Weights of Evidence (CART-WOE). In a first step, a geospatial database was created for the study area. This database includes 132 flood locations and 14 conditioning factors (lithology, slope angle, plan curvature, hydrological soil group, topographic wetness index, landuse, convergence index, elevation, distance from river, profile curvature, rainfall, aspect, stream power index, and topographic position index). In the next step, the Information Gain Ratio was used to evaluate the predictive ability of these factors. Subsequently, the database was used to train and validate the six ensemble models. The Receiver operating characteristic (ROC) curve, area under the curve (AUC), and statistical measures were used to evaluate the performance of the models. The results show that the prediction capability of the proposed ensemble models varied from 86.8% (the RF-FR model) to 93.9% (the RF-WOE model). These values indicate a high prediction performance for all the models. Therefore, we can state that the proposed ensemble models are new reliable tools which can be used for flood susceptibility modelling.

Keywords : Flood susceptibility Bivariate statistics Machine learning Artificial intelligence Hybrid models Romania

Image Processing-based Flood Detection for Online Flood Early Warning System

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Abstract—this paper will discuss the design of an online flood early warning system. This system will use a single board computer Raspberry-PI as the main controller, and a webcam to capture image. This system is integrated to Twitter. In hardware section, Raspberry-PI has main tasks as an image processor and do an update request to Twitter. In software section, OpenCV will be used as Image Processing software. Some method which used in this system is: 1) Region of Interest: this method is to create a portion of an image that you want to filter or perform some other operation on. Brightness and contrast: these methos is used in order to get brighter and better image before next process. 3) Grayscale and threshold: this method is to create an object segmentation. Otsu-thresholding is used on this step. 4) Edge detection: edge detection algorithm to find edge points on a (relatively) horizontal water line and point of dam's height. By using these methods, the system can read and monitor the water level in the dam. If the water level exceeds the specified threshold, this system will generate an early warning of impending floods by doing update time line (text and image) of water level conditions to Twitter. The public will get the information if they following early warning system's Twitter. Simulation test results show the system can read water level with an accuracy nearing 96%.

Keywords— Raspberry-PI, Region of Interest: this method, Grayscale and threshold, Edge detection

Urban flood risk mapping using the GARP and QUEST models: A comparative study of machine learning techniques

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Abstract— Flood risk mapping and modeling is important to prevent urban flood damage. In this study, a flood risk map was produced with limited hydrological and hydraulic data using two state-of-the-art machine learning models: Genetic Algorithm Rule-Set Production (GARP) and Quick Unbiased Efficient Statistical Tree (QUEST). The flood conditioning factors used in modeling were: precipitation, slope, curve number, distance to river, distance to channel, depth to groundwater, land use, and elevation. Based on available reports and field surveys for Sari city (Iran), 113 points were identified as flooded areas (with each flooded zone assigned a value of 1). Different conditioning factors, including urban density, quality of buildings, age of buildings, population density, and socio-economic conditions, were taken into account to analyze flood vulnerability. In addition, the weight of these conditioning factors was determined based on expert knowledge and Fuzzy Analytical Network Process (FANP). An urban flood risk map was then produced using flood hazard and flood vulnerability maps. The area under the receiver-operator characteristic curve (AUC-ROC) and Kappa statistic were applied to evaluate model performance. The results demonstrated that the GARP model (AUC-ROC = 93.5%, Kappa = 0.86) had higher performance accuracy than the QUEST model (AUC-ROC = 89.2%, Kappa = 0.79). The results also indicated that distance to channel, land use, and elevation played major roles in flood hazard determination, whereas population density, quality of buildings, and urban density were the most important factors in terms of vulnerability. These findings demonstrate that machine learning models can help in flood risk mapping, especially in areas where detailed hydraulic and hydrological data are not available.

Keywords : Urban planning, Flood risk management, GISFANP, Data-mining

Machine learning for geographically differentiated climate change mitigation in urban areas

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Abstract—Artificial intelligence and machine learning are transforming scientific disciplines, but their full potential for climate change mitigation remains elusive. Here, we conduct a systematic review of applied machine learning studies that are of relevance for climate change mitigation, focusing specifically on the fields of remote sensing, urban transportation, and buildings. The relevant body of literature spans twenty years and is growing exponentially. We show that the emergence of big data and machine learning methods enables climate solution research to overcome generic recommendations and provide policy solutions at urban, street, building and household scale, adapted to specific contexts, but scalable to global mitigation potentials. We suggest a meta-algorithmic architecture and framework for using machine learning to optimize urban planning for accelerating, improving and transforming urban infrastructure provision.

Keywords: Artificial intelligence, climate change, remote sensing, big data, global mitigation, urban infrastructure

A Research Paper on the Performance of Synthetic Fiber Reinforced Concrete

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Abstract:

When fibrous materials are used in manufacturing, then it is known as Fibre Reinforced Concrete. Different types of fibres may be used in concrete such as steel fibres, glass fibres, synthetic fibre and even natural fibre. Synthetic fibre reinforced concrete uses plastic and nylon fibres for enhancement of the strength of concrete. Synthetic fibres have a wide range of benefits over other fibres. The usage of Synthetic fibres gives higher compressive strength, high tensile strength and high flexural strength. Besides, there are other benefits like improving ductility, reduction in steel reinforcement requirements, increased resistance to plastic shrinkage during curing, improving impact resistance and abrasion resistance.

Key Words: synthetic fibres, concrete, compressive strength, tensile strength, flexural strength,

Fiber Reinforced Concrete (FRC) for High Rise Construction

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Abstract:

Due to its material element, Fiber Reinforced Concrete (FRC) could be stronger than traditional Concrete. This is due to FRC internal material compounds and elements. Furthermore, FRC can also significantly improve flexural strength when compared to traditional Concrete. This improvement in flexural strength can be varied depending on the actual fibers used. Although not new, FRC is gradually gaining popularity in the construction industry, in particular for high rise structures. This is due to its flexural strength, especially for high seismic zones, as it will provide a better solution then reinforced Concrete. The main aim of this paper is to investigate the structural importance of FRC for the high rise construction. Although there has been numerous studies and literature in justifying the FRC for general construction; this paper will consider its use specifically for high rise construction. Moreover, this paper will closely investigate eight case studies from Australian and United States as a part of the FRC validation for high rise construction. In doing so, this paper will examine their Structural Health Monitoring (SHM) to determine their overall structural performance.

Key Words: FRC, Flexural Strength, Structural Health Monitoring

Study of Geopolymer Concrete-A Cementless Concrete and its Durability

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Abstract:

The geopolymer technology has shown considerable good results for construction industry as an alternative binder to Portland cement. In construction industry applications a water resistant binder with sufficient strength is desirable. In addition the production technology necessitates an adequate processing time. Nevertheless after the shaping procedure the material should be demoulded immediately to enable feasible production. Therefore the binder should show a rather a late beginning of setting, but it should be possible to accelerate strength evolution when the material is shaped. The form of cementitious material using silicon and aluminum activated in a high alkali solution was developed. This material is usually based on fly ash as a source material and is termed geopolymer or alkali-activated fly ash cement. The mortar and concrete made from this geopolymer possess similar strength and appearance to those from ordinary Portland cement. Geopolymer exhibit many excellent properties such as high compressive strength, low creep, good acid resistance, low shrinkage, fire resistance and other mechanical properties. The work on geopolymer has been based on the normally used low calcium fly ash. Low calcium fly ash has been successfully used to manufacture geopolymer concrete when the silicon and aluminium oxides constituted about 80% by mass, with the Si-to Al ratio of about 2. It is also known that high calcium fly ash contains a reasonable amount of silica and alumina. This high calcium fly ash could also be suitable for use as base material for making geopolymer.

Key Words: Cement less concrete, Geopolymer, Ground Granulated Blast Furnace Slag, durability

Developing Geopolymer Concrete Properties by Using Nanomaterials and Steel Fiber

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Abstract:

This research investigates the simultaneous impact of two different types of steel fibers, nanometakaolin, and nanosilica on the mechanical properties of geopolymer concrete (GPC) mixes. To achieve this aim, different geopolymer concrete mixes were prepared. Firstly, with and without nanomaterials (nanosilica and nanometakaolin) of 0, 2%, 4%, 6%, and 8% from ground granulated blast furnace slag (GGBFS) were used. Secondly, steel fiber (hooked end and crimped) content of (0, 0.5%, 1, and 1.5%) was used. Thirdly, optimum values of nanomaterials with the optimum values of steel fiber were used. Crimped and hooked-end steel fibers were utilized with an aspect ratio of 60 and a length of 30 mm. Geopolymer mixes were manufactured by using a constant percentage of alkaline activator to binder proportion equal to 0.45 with GGBFS cured at ambient conditions. For alkaline activator, sodium hydroxide molar (NaOH) and sodium hydroxide solution (NaOH) were used according to a proportion (Na2SiO3/NaOH) of 2.33. The hardened concrete tests were performed through the usage of splitting tensile strength, flexural, and compressive experiments to determine the impact of steel fibers, nanometakaolin, and nanosilica individually and combined on performance of GPC specimens. The results illustrated that using a mix composed of the optimum steel fibers (1% content) accompanied by an optimum percentage of 6% nanometakaolin or 4% nanosilica demonstrated a significant enhancement in the mechanical properties of GPC specimens compared to all other mixtures. Besides, the impact of using nanomaterials individually was found to be predominant on compressive strength on GPC specimens especially with the usage of the optimum values. However, using nanomaterials individually compared to using the steel fibers individually was found to have approximately the same splitting tensile strength and flexural performance.

Key Words: Nanomaterials, Geopolymer, GGBFS, GPC

Simulation of the Bluetooth Inquiry Process for Application in Transportation Engineering

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Abstract:

In recent years, Bluetooth technology has been adapted for use as a sensor for measuring vehicle travel times along a segment of roadway. However, using the Bluetooth technology in advanced traffic management systems has been limited in part, because there is a lack of tools, such as simulation, to predict the behavior of the system before it is developed and deployed. A number of studies have been published describing the Bluetooth technology, inquiry, and pairing process. Most of these studies have focused on the simulation of the first successful inquiry and reduction of the pairing time. However, in many traffic sensing applications, Bluetooth detectors are designed to stay in the inquiry stage and will continuously perform inquiry scans. These detectors will not proceed to the paring stage and multiple inquiry scans may occur on each device during the time these devices remain in the detection zone of the detector. In this paper, we propose a simulation framework that considers multiple inquiry scans and the effect of distance from the detector on the inquiry process. The simulation model was calibrated and validated using the field data collected from two custom-built Bluetooth detectors. The simulation framework has been made into a simulation software tool entitled blue synthesizer, which can be combined with commercially available traffic on micro simulation models to evaluate the use of Bluetooth technology within advanced traffic management systems.

Key words— Bluetooth, inquiry, simulation, advanced traffic management systems

Recent Management Strategies for Municipal Solid Wastes

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Abstract:

Municipal solid waste (MSW) is a major environmental problem in India, as in many developing countries. Problems associated with municipal solid waste are difficult to address, but efforts towards more efficient collection and transportation and environmentally acceptable waste disposal continue in India. Although strict regulations on the management of solid waste are in place, primitive disposal methods such as open dumping and discharge into surface water have been used in various parts of India. This study presents a brief history of the legislative trends for MSW management. The study also presents the MSW responsibility and management structure together with the present situation of generation, composition, recycling, and treatment. The results show that approximately 25 million ton of MSW are generated annually in India. About 77% of the population receives MSW services. In spite of efforts to change open dumping areas into sanitary landfills and to build modern recycling and composting facilities.

Key Words: Municipal Solid Waste

Programs Management and Integrated Product/Process Development in High Technology Industries

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Abstract:

A summary overview is presented on program management and its evolution to a team process of product development (simultaneous engineering, etc.). Aspects of program management and product/process integration are addressed. The team program planning, documentation, and control process for the product-realization (transformation) management process are also presented and reviewed. Reference is made to a number of companies that are implementing the program/project management team product/process development process. The most recent one to be documented is that of Philips Research Laboratories, which has just moved to this form of product development management process to speed up the effectiveness of product flow from the research laboratories into the product-manufacturing centers in the face of pressures from international competition.

Key Words: Simultaneous Engineering, Product-Realization

Responsible Research and Innovation in Engineering and Technology Management: Concept, Metrics and Assessment

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Abstract:

Responsible Research and Innovation (RRI) is a recent conceptual response of the European Union to the challenge of aligning research and innovation (R&I) activities with societal goals and purposes. This paper critically analyzes this concept with a view of its coherence and applicability to engineering and technology management. Authors discuss the RRI relation to Technology Assessment (TA) and Corporate Social Responsibility and review the possible approaches to the measurement and assessment of R&I activities in the context of RRI. Theoretical and practical obstacles to RRI implementation are presented. Authors call for more groundwork in clarifying the theoretical underpinnings of RRI. Furthermore, they conclude that innovative business and industry may benefit from self-reflection and self-assessment in the framework of RRI, however there is still a need to refine available tools and develop more industry specific approaches to responsibility in R&I.

Keywords — Responsible Research and Innovation, responsibility, innovation, engineering, technology management, Technology Assessment

Survey and Introduction to the Focused Section on Mechatronics for Sustainable and Resilient Civil Infrastructure

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Abstract:

The application of mechatronics in civil engineering has increased the sustainability and resilience of large-scale civil infrastructure, whose safe operation is among the utmost important issues concerning human society and our daily lives. Meanwhile, challenges faced in large-scale infrastructure applications bring about interesting and new topics for research in mechatronics. This paper firstly reports a brief survey of the recent research progresses on the construction automation in civil engineering, intelligent sensing, structural monitoring and health management, and feedback control of structural vibration. Next, a brief highlight to eight papers in this "Focused Section on Mechatronics for Sustainable and Resilient Civil Infrastructure" is provided. Finally, some latest topics, challenges, and the future trends of mechatronics application in civil infrastructure are discussed.

Key Words—Actuator, civil infrastructure, construction equipment, control, field robot, sensing, vibration

Investigation on Properties of Steel Fibre Reinforced Concrete

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Abstract:

The use of Steel Fibre Reinforced composites in infrastructure applications is becoming more popular with the introduction of new high performance materials. Steel Fibre Reinforced composites are introduced to enhance the overall performance of structures, such as composite bridge decks, beams, bearing walls, etc. This review from the past experiences presents the results of experimental and analytical studies done on composite material made of Fibre reinforced concrete overlaid on Conventional Reinforcement with Concrete. Results show that the composite structures possess good compressive strength, tensile strength, flexural strength, cracking strength and ultimate capacity.

Keywords—Concrete, Steel fibre, workability, compressive strength

Effects of Vertical Component of Earthquakes on Cable-Stayed Bridges

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Abstract:

The vertical component of ground motions is known to cause severe damages to certain structures. Long span cable-stayed bridges are among those vulnerable structures due to their high mass and cables that take no compression. In this paper, the vertical earthquake effects on several cable-stayed bridges have been investigated using 3-D nonlinear time history finite element analyses. Different main span lengths, pylon shapes and pylon/deck connection types are considered. The results indicate that the vertical ground motion component should be considered in the analysis of such bridges and affects many key elements of the bridge.

Key Words: Cable Stayed Bridges, Vertical Component, Finite Element Analysis

Application of Optical Fiber Sensors for Crack Monitoring in a Masonry Structure during Geotechnical Foundation Remediation

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Abstract:

This paper aims to propose a monitoring strategy for the assessment of the efficiency of polyurethane resin injection as a treatment technique in damaged masonry structures. The polyurethane resin injection technique is mainly adapted in repairing shallow foundations by densifying the soil and increasing its bearing capacity. Since the distribution path of this expansive resin into the soil is not well known, it makes it difficult to avoid further structural damage to the buildings. In order to avoid these kinds of additional damages on a cracked masonry structure, a field measurement technique was adapted during geotechnical remediation operations. Fiber Optic Sensors (FOS) were installed on four angles of the building in order to measure the local micro strains of the walls as well as the existing cracks dynamics (openings/closings). A geotechnical investigation survey was also carried out both at laboratory and field scale before and after the treatment process. The mechanical properties of the soil were investigated before and after the remediation process using in-situ dynamic penetrometer test (PANDA test). Results showed that fiber optic sensors are able to capture indirectly the improvements of soil properties in crack dynamics.

Key Words: Damaged Masonry, Bearing Capacity, FOS, PANDA Test

Virtual graphic representation of construction Equipment for developing a 3D earthwork BIM

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Abstract:

BIM provides a visualization of the construction design that allows a construction manager to review the construction process and the information that is associated with the progress. BIM is usually applied to modeling structural objects with parametric geometry where the sequence of process can be predefined. However, BIM technology can also be applied to objects with irregular shape where parametric modeling is not possible such as earthwork topography based on TIN (Triangular Irregular Network).The objective of this research is to develop a 3D earthwork BIM methodology and provide a graphic simulation that is capable of assisting construction equipment operators during excavation work. The 3D earthwork BIM presents a modeling technique that involves integrating hardware and software technologies. This combination of technologies is used to represent the actual excavator configuration in a 3D virtual environment. When it is applied to actual excavation work, it was proved that the 3D earthwork BIM could synchronize the virtual excavator configuration with the actual excavator configuration during excavation work in real time.

Keywords: BIM, earthwork operation, construction equipment, geographical modeling, excavator, graphic simulation

FSK based on FRFT for Underwater Acoustic Communication

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Abstract

Chirp spread spectrum has poorly rate of transmission in shallow water acoustic channel because of its channel parameters in the random changes. This paper proposes a novel chirp spread spectrum modulation system based on the explicit relationship between fractional Fourier transform (FRFT) properties of Chirp-FSK signals and their parameters (Chirprate and central-frequency). The system is easy to control parameters and gives a trade-off between BER and rate of transmission by modulation parameters adjusting. The paper proposed spread spectrum communication system based on Chirp signal has good anti-noise and anti-multipath.

Keywords

Chirp,Frequency shift keying,Underwater coustics, Bandwidth, Demodulation

GPS and GSM based Rail Signaling and Tracking System

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Abstract

In this paper, we propose a system for monitoring, tracking, and automating the trains. In contrast to the existing methods, we employ a global position system (GPS) and Global System for Mobile communication (GSM) by which each train is individually monitored and necessary messages are passed on proactively. The proposed system has advantages in terms of communication range and accuracy with respect to Zigbee, Wi-Fi, RFID based rail tracking method. The work has potential applications in bad weather and emergency situations like collision.

Keywords: Global Positioning System, GSM, Rail transportation, Radiofrequency identification, Real-time systems, Rails, Information technology

Multi-level Coded Modulation Scheme for the Next Generation Optical Communication Systems

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Abstract

In this paper, we mainly focus on the optimization of multi-level coded modulation scheme in terms of sub-channel code rate optimal assignment and irregular QC-LDPC code construction with the aid of EXIT chart analysis. Simulation results show that the proposed MLCM scheme can achieve additional 0.1dB NCG compared with the UEP coded modulation scheme.

Keywords: Modulation, Decoding, Optical fiber communication, Parity check codes, Bit error rate, Encoding, Gain

An Efficient Association of A Mobile Client In Wireless Mesh Network

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Abstract

Wireless Mesh Network (WMN) is an upcoming technology that supplements wired infrastructure with wireless backbone to provide Internet connectivity to mobile nodes (MN) or users in residential areas and offices. The comparison has been done under two protocols namely UDP and TCP. The tools used for the simulation are NS2 which is the main simulator, The results also illustrate the important characteristics of different protocols based on their performance and thus suggest some improvements in the respective protocols.

Keywords: Wireless communication, Ad hoc networks, Routing protocols, Communication system security.

PC to PC Data Transmission using Visible Light Communication

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Abstract

Visible Light Communication (VLC) can be concisely stated as Data Transmission Through Illumination. Data transmission through visible light communication is much more secure and is capable of achieving high data transmission rates as compared to existing conventional wireless technologies like Wi-Fi, Bluetooth, Wi-max, etc., which uses radio frequency spectrum. This project aims at building a wireless VLC system capable of transmitting text data between two computers using visible light. A Light Emitting Diode (LED) is used as the transmitter, air as the transmission medium and a Light Dependent Resistor (LDR) as the receiving component. Text data gets transmitted as strings of 1s and 0s as the LED flickers on and off, rapidly at a rate undetectable to the human eye.

Keywords: MATLAB, Light emitting diodes, Receivers, Transmitters, Visible light communication, Pins.

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Long-distance Underwater Laser Communication System with Photon-counting Receiver

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Abstract

We design and demonstrate a long-distance underwater optical communication system with photon-counting receiver. Monte-Carlo simulations are conducted to determine system parameters and estimate system performance. According to the simulation results, a Q-switched all solid state 532nm laser with pulse energy of 100uJ@10kHz is used as the optical source of transmitter. A telescope with 1° field of view, 100mm clear aperture, and a photon counting detector is used to collect the laser in the photon-counting receiver. We then present an experimental implementation in a long tank filled with clean water. The experimental results show that optical communication is established over a distance of 85m(~24 optical attenuation lengths) at a data rate of 80kbps.

Keywords: Photonics, Optical transmitters, Optical fiber communication, Lasers, Monte Carlo methods, Optical receivers

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Fingertip based heart beat monitoring system usingembedded systems

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Abstract

In recent technological innovations in the field of disease prevention and maintenance of patient health have enabled the evolution of fields such as monitoring systems. Heart rate is a very vital health parameter that is directly related to the soundness of the human cardiovascular system. It can be measured either by the ECG waveform or by sensing the pulse - the rhythmic expansion and contraction of an artery as blood is forced through it by the regular contractions of the heart. The pulse can be felt from those areas where the artery is close to the skin. This paper describes a technique of measuring the heart rate through a fingertip and Arduino. It is based on the principal of Photo Phelthysmo Graphy (PPG) which is non-invasive method of measuring the variation in blood volume in tissue using a light source and detector.

Keywords: Sensors, Heart beat, Monitoring, Pins, Blood, Light emitting diodes

Achievable Rate For A Mobile Molecular Communication System Invited Paper

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Abstract

Molecular communication (MC) enables conveying information by emitting and sensing molecules at a micro-to nano-scale. MC systems for fixed nanomachines have been extensively investigated. However, the scenarios for mobile MC are seldomly studied. In the paper, the mutual information and maximum achievable rate for the mobile MC is investigated. The movement of the receiver nanomachine is modeled as a 2-D random walk. The channel impulse response is changing due to the moving property of the nanomachine. The mutual information and maximum achievable rate are analytically derived for the mobile scenario. Numerical results evaluates the influence of different parameters such as original transmitter-receiver distance, signal-to-noise ratio, threshold, and priori probabilities of transmitted symbol to the mutual information and maximum achievable rate.

Keywords: Receivers, Mobile communication, Transmitters, Mutual information, Signal processing, Molecular communication.

Innovation of mobile aaps markets: Anew subscription plan to study the consumer acceptance

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ABSTRACT

Current research emphasizes that consumer acceptance of mobile (m-)shopping increases overall order rate and size. However, there has been little knowledge on factors determining this acceptance. This study develops and empirically tests a model explaining the consumer acceptance of m-shopping by incorporating intrinsic (perceived enjoyment) and extrinsic (perceived usefulness, perceived ease of use) behavioural beliefs as well as consumer shopping orientations. A quantitative survey conducted among German smartphone users across different age groups reveals that both intrinsic and extrinsic beliefs determine consumer acceptance of m-shopping, while consumer shopping orientations shape the beliefs of m-shopping. In particular, the greater the consumers' brand consciousness, novelty-seeking tendency, and impulsiveness the greater the perceived usefulness and/or enjoyment of m-shopping; however, consumers' convenience consciousness weakens the perceived enjoyment. The results further indicate that the effects of shopping orientations on the beliefs are largely independent of the type of m-shopping touchpoint (i.e., m-app and m-browser). The findings provide recommendations for retailers on how to promote m-shopping and offer scholars a broad and consumer-oriented explanation of the acceptance of m-shopping.

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Collaboration of R&D plans for implementation of industry 4.0

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Abstract

Companies need to collaborate with partners to co-create digital solutions as part of Industry 4.0 implementation. The objective of this study is to investigate how collaborative partnerships contribute to the digital transformation of organizations. The research design is based on a case study investigation of a Brazilian manufacturing company. The findings indicate that the company is already generating results through its commitment to open innovation practices. The results indicate that business success depends more on how disruptive technologies are developed and utilized by engaged people to add value, rather than focusing on the adoption of new technologies.

Research on the influence of technological innovation and implementation

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Abstract

New Technologies have become an intrinsic component of our working lives. They are infiltrating every facet of our lives and adopting an increasingly organic quality as they become, literarily, part of us, rather than something "out-there", as they have been throughout human history. These technologies will certainly make it easier, quicker, and less expensive for all people to communicate with one another. They may contribute to the globalization of not only trade and commerce and to greater international political, social and cultural integration and a move away from the tribal and ethnic conflicts that have dominated human history. The "virtual corporation" and "Visual Workplace" will become an increasingly common organizational form. Furthermore, mechanisms to "manage" technological changes have been historically unsuccessful, as technological development has always out passed the ability of governments or business to regulate its use. The transition from nation-based industrial age to a global digital age will require people other than technical specialists to provide input into developing new management and leadership skills. This paper describes these new and emergent technologies. It then looks at their effects on organizations and management practices and their potential impact on global organization of the future. Also, this paper examines how leaders and leadership can deal with the impact of new technologies on their organizations, employees and work environment

Production outsourcing and E-business adoption by Odisha Manufacturing firms

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Abstract

This paper studies the adoption of e-business by manufacturing firms. We augment the Technology–Organization–Environment (TOE) framework to consider two organizational features, namely, production outsourcing and technological cooperation. We test the model on a longitudinal sample of Spanish firms covering the period 2002–2014. The results reveal that firms that outsource production are more likely to adopt Supplier-to-Business (S2B) and Business-to-Business (B2B). Technological cooperation with customers and suppliers also has a positive impact on S2B and B2B adoption.

Team intuition and creativity in new product development project

PRATAP KUMAR PATI

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Abstract

Team intuition and creativity are growing research areas in the new product development (NPD) literature. However, past studies superficially investigated the relationship between team intuition and team creativity, in terms of team outcome, based on the narrow conceptualization and operationalization of team intuition in the NPD literature. In this study, we first explore the different aspects of team intuition by conducting 18 interviews on 4 different NPD projects in a phenomenographic study. We discover that team intuition has different aspects, namely, the holistic, affective, inferential, attitudinal, free, social, and moral in this qualitative study. We also noticed that each aspect has different features that distinguish it. Second, we tested the effect of team intuition aspects on team creativity, using a fuzzy-sets qualitative comparative analysis (fsQCA) in a quantitative study. By investigating 148 NPD teams, we found that affective intuition is a core and yet still an absent condition for full higher team creativity. Inferential intuition is a core and necessary condition for higher team creativity. In a complementary Partially Least Square (PLS) analysis, we found that the positive influence of affective intuition on team creativity is achieved by using other team intuition aspects (i.e., social, free and attitudinal aspects). We also determined that moral and social intuition are the gateways between affective intuition and other intuitions, i.e., free, inferential, holistic, and attitudinal. Further, we found that inferential intuition is positively associated with team creativity. We then discussed the theoretical and managerial implications of all our findings.

Power management strategies of distributed generation: A comprehensive review

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Abstrac: The relevance of distributed generating power systems is growing due to rising energy consumption, lowcost needs, and higher reliability requirements (DGPSs). To meet system reliability and power quality requirements, large capacity DGPSs require high performance control algorithms and synchronisation approaches based on positive-negative sequence (PNS) extractors, not only under normal operating settings, but also under unbalanced grid situations.Voltage unbalances, voltage sag/swell, voltage fluctuations, phase faults, and harmonic distortions all have a significant impact on the control of power converter devices connected to DGPSs. Novel control mechanisms based on phase locked loops (PLLs) approaches and PNS extractors have been employed in literature research to solve these issues. In this study, a thorough investigation and discussion of several advanced control techniques and PNS extractors for interlinking three phase inverters in DGPSs is conducted under both normal and abnormal situations.Several PNS extractors have been examined in order to provide the sequence components necessary for the creation of reference current (RCG). To address power quality issues, the theoretical assessment of RCG-based flexible control techniques and overcurrent limitation control is also thoroughly examined, surveyed, and compared. PNS extractors, voltage/current regulation controllers, and RCG-based control techniques have all been compared and analysed in depth. Researchers exploring the influence of normal and abnormal circumstances on various control techniques with or without employing PLLs based PNS extractors for three-phase inverters interfaced DGPSs may benefit from the extensive overview provided.

Power factor correction techniques in microgrids

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Abstract: Power factor correction is the term given to atechnology that has been used since the turn of the20th century to restore the power factor to as close tounity as is economically viable. This is normallyachieved by the addition of capacitors to the electricalnetwork which compensate for the reactive powerdemand of the inductive load and thus reduce theburden on the supply. There should be no effect on theoperation of the equipment.To reduce losses in the distribution system, and toreduce the electricity bill, power factor correction,usually in the form of capacitors, is added to neutralizeas much of the magnetizing current as possible.Capacitors contained in most power factor correctionequipment draw current that leads the voltage, thusproducing a leading power factor. If capacitors areconnected to a circuit that operates at a nominallylagging power factor, the extent that the circuit lags isreduced proportionately. Typically the corrected powerfactor will be 0.92 to 0.95. Some power distributors offerincentives for operating with a power factor of betterthan 0.9, for example, and some penalize consumerswith a poor power factor. There are many ways thatthis is metered but the net result is that in order toreduce wasted energy in the distribution system, theconsumer is encouraged to apply power factorcorrection. Most Network Operating companies nowpenalize for power factors below 0.95 or 0.9.

Energy management in microgrid: A Review

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Abstract: Renewable energy resources are now being implemented on a huge scale to fulfil the demands of rising energy consumption, reduce pollution, and provide socio-economic advantages for long-term development. Microgrids are made possible by the integration of dispersed energy sources into the utility grid. The microgrid idea is used to describe a self-contained system made up of distributed energy resources that can function in an isolated mode during grid outages.An energy management system is required in a microgrid to make the best use of these dispersed energy resources in an intelligent, secure, dependable, and coordinated manner. As a result, this review article provides a comparative and critical study of decision-making techniques for microgrid energy management systems, as well as their solution approaches. Various uncertainty quantification strategies are presented to control the volatility and intermittency of renewable energy supplies and load demand.A cost-effective deployment of microgrid energy management systems is also covered, as is a comparative comparison of communication technologies. Finally, future directions are discussed, as well as real-world applications.

Performance of Solar photovoltaic using fuzzy logic

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Abstract: Due to advantages such as low maintenance and environmental benefits, photovoltaic (PV) power generation has become one of the principal power sources in recent decades. Furthermore, the generation source is, in the end, free and plentiful. Low power conversion efficiency, high PV module costs, and nonlinearity in output power are the key challenges to PV power generation. PV systems should always operate at their Maximum Power Point due to their low power conversion efficiency (MPP).PV systems use a power conditioning equipment using the Maximum Power Point Tracking (MPPT) technology to gather maximum power. The basic purpose of MPPT is to find the MPP for a particular set of conditions and run the system accordingly. This research presents a variable step size MPPT based on a Fuzzy Logic Controller (FLC) for a solo solar PV system. Matlab/Simulink is used to create a solar PV system with a fuzzy based MPPT controller.For various input conditions, the performance of the proposed variable step size fuzzy MPPT algorithm is investigated and analysed in terms of performance parameters such as tracking speed, steady state oscillations, response to changes in irradiance and temperature, average output power, and output power ripple. The findings are compared to a typical InC-based PV system and the Variable Step Size Incremental Conductance (VSS InC) MPPT method.

Review of recent trends in optimization techniques for solar photovoltaic–wind based hybrid energy systems

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Abstract: It is offered an updated literature assessment on developments in optimization strategies used for the design and development of solar photovoltaic–wind based hybrid energy systems. The major goal is to find the most cutting-edge approaches for optimising solar photovoltaic (PV)–wind hybrid systems. The many methodologies utilised by researchers for the optimization of renewable-based hybrid energy systems are discussed, as well as PV–wind hybrid system sizing methodology. Researchers' optimization investigations employing classic and new generation approaches during the previous 2.5 decades are examined, and sixteen optimization methods, including hybrid algorithms, are provided.In comparison to old approaches, new generation artificial intelligence algorithms were widely adopted in the recent decade since they take less computing time and have superior accuracy and convergence. To circumvent the limits of a single algorithm, the paper advises adopting hybridization of two or more algorithms. Other strategies for further investigation in the design of PV–wind hybrid systems are also highlighted. This review will help academics deal with the complexities and problems of researching renewable energy-based hybrid systems.

Power quality Improvement of grid connected solar energy system

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Abstract: There are several technical issues associated with grid connected systems like Power Quality Issues, Power and voltage fluctuations, Storage, Protection issues, Islanding. Power Quality issues are harmonics and voltage and frequency fluctuations.The necessity to create pollution-free energy has prompted an increase in the use of solar energy connectivity to the grid. As a result, the photovoltaic [PV] panel connected to the grid produces power quality issues such as harmonics, voltage sag, and so on. Active power filters are an effective method for reducing harmonics. The approach for increasing power quality of the grid interfaced with renewable energy is described in this proposed study. The inverter utilised in this manner may also be used as a power converter to inject solar electricity into the grid while simultaneously providing harmonic adjustment. Dynamic simulation using the MATLAB/Simulink Power system toolbox is used to evaluate the suggested approach.

power quality issues in grid integration of wind and photovoltaic energy conversion system

Sashi Bhusan Mohanty
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Abstract: There are several technical issues associated with grid connected systems like Power Quality Issues, Power and voltage fluctuations, Storage, Protection issues, Islanding. Power Quality issues are harmonics and voltage and frequency fluctuations.This article examines grid integration and power quality challenges relating to the integration of renewable energy sources into the grid, as well as the role of power electronic devices and flexible AC transmission networks in these issues. Recent advances in power electronics for the integration of wind and photovoltaic (PV) power producers are discussed in this study.On the basis of the dependability and maturity of each technology, discussions concerning current and future trends in renewable energy systems are provided. The classification of various Power Quality Issues utilised by many researchers has been completed and is available for use as a reference. A variety of strategies that have been used to minimise various Power Quality issues are also provided for consideration.The power electronics interface is critical not only for successful integration of wind and solar energy systems, but also for their impacts on power-system operation, particularly when renewable energy sources account for a major portion of the overall system capacity. However, there are a number of challenges with RES grid integration, and in light of the aforementioned tendencies, it is vital to study potential solutions.

Harmonic mitigation techniques in grid tied Solar Photovoltaic Systems

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Abstract: The majority of renewable energy technologies function in tandem with the existing electrical infrastructure. Power quality is critical in photovoltaic (PV) grid-connected inverter systems. As a shunt active filter, this research proposes a grid-connected photovoltaic (PV) system that can not only inject active power into the grid but also compensate harmonics and reactive power of nonlinear loads. The assessment of an inverter for transferring electrical energy from a PV module to the grid is based on high dependability, cheap cost, and mass production.Different, types of inverter topologies exist, are associated with, and are computed in relation to demand, component rating, and rate. PV system with inverter to clarify electricity performance under various operating conditions.To address the existing challenge, this research offers an adaptive hysteresis approach for solar PV system grid linked inverters. Adaptive hysteresis current control alters the hysteresis band width, allowing modification of the frequency, supply voltage, dc capacitor voltage, and reference current wave. The hysteresis current controller also controls the shunt active power filter's switching time. The maximum power point tracking (MPPT) method is utilised to extract maximum power from PV under various sun irradiances; as a result, the system functions as an active filter in the dark and as both a power conditioner and a shunt active filter in the light.

Current Li-Ion Battery Technologies in Electric Vehicles and Opportunities for Advancements

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Abstract:The number of electric vehicles (EVs) has steadily increased over the last several decades. According to projections, more than 125 million electric vehicles will be on the road worldwide by 2030. The lithium-ion (Li-ion) battery, which provides the essential energy storage, lies at the core of these modern vehicles. This study examines and contrasts essential components of Li-ion batteries, as well as battery management systems and methods for improving overall battery efficiency, capacity, and longevity. The importance of material and thermal properties in battery performance has been discovered. The physical implementation of Li-ion batteries, as well as positive and negative electrode materials, electrolytes, and electrolytes, are covered. In addition, current research on innovative high-energy-density batteries is discussed, as well as repurposing and recycling the batteries.

Electric Vehicle Scenario in India:Aperspective

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Abstract: Electric Vehicles (EV) has recently been gaining increased worldwide interest since they result in far less climate pollution than their gas-powered counterparts. The main challenges in adoption of EV are insufficient charging stations, long charging time, high initial cost and limited range. Making India an all EV market by 2040 also ushers in incentives for the development of EVs like the Faster Adoption & Manufacturing of Electric Vehicles (FAME) Scheme in 2015 to incentivize manufacturing of Eco-friendly vehicles including Hybrid Electric Vehicles (HEV). The Indian automotive industry is the fifth largest in the world and is slated to be the third largest by 2030. Catering to a vast domestic market, reliance on the conventional modes of fuel intensive mobility will not be sustainable. In an effort to address this, federal policymakers are developing a mobility option that is "Shared, Connected, and Electric" and have projected an ambitious target of achieving 100 percent electrification by 2030. This paper is focused on providing an overall picture of the modern Electric Vehicle scenario and areas for further growth.

Analysis for STATCOM in Low and Medium Voltage Systems

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Abstract: The fast growth and enhancement of power electronics devices in recent decades has dramatically altered the landscape in the field of regulating and enhancing power quality concerns and related challenge.The FACTS devices are an excellent illustration of this. As a result, one FACTS device called as STATCOM is used in this research.shunt controller, in order to explore its influence and how to enhance power quality in depth by studying previous publicationspublished on numerous types and configurations of STATCOM, employing diverse methodologies and setups in order to harmonics are reduced, and dynamic performance is improved. A review of the previous literature published on the subject is conducted.STATCOM comes in a variety of kinds and configurations, most of which are based on a current source inverter or a voltage source inverterbased.

Optimized switching scheme of cascaded H-bridge multilevel inverter using GWO

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Abstract: Multilevel inverters are a new class of dc-ac converters designed for high-power medium voltage and power applications as they work at high switching frequencies and in renewable applications by avoiding stresses like dv/dt and has low harmonic distortion in their output voltage. In variable speed drives and power generation systems, the use of multilevel inverters is obligatory. To estimate the switching positions in inverter configuration with low harmonic distortion value, a fast sequential optimization algorithm has been established. For harmonic reduction in multilevel inverter design, a hybrid optimization technique combining Firefly and the Genetic algorithm was used. In several real-time systems and for solving complex engineering problems, optimization approaches are gaining popularity. Based on Grey Wolf Optimization (GWO), this research paper proposes a novel multilevel inverter architecture. The GWO algorithm is based on the natural leadership hierarchy and hunting mechanism of grey wolves (Canis lupus). The Grey Wolf Optimizer (GWO) algorithm is used to find the best switching angles for a cascaded multilevel inverter in order to eliminate some high order harmonics while sustaining the desired fundamental voltage. The proposed inverter has 15 stages, and the circuit's unique feature includes a limited switching device. This proposed method comprises, MOSFET-based switches well as three DC sources in the main circuit. The switching parameters of the inverter topology are tuned using GWO in this methodology. The THD value of the proposed system is reduced to 6.629% compared to that of Multilevel Inverter using Genetic Algorithm, standalone power supply, Firefly assisted Genetic Algorithm, hybrid APSO algorithm, DC voltage regulation and FPGA. A few simulation studies have been included in this paper to affirm the capability of the hybrid topologies with various condition parameters, dynamic changes, and modulation indexes.

Grid integration of a PV system using Slap Swarm Optimization

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Abstract: Modular Multilevel Converters (MMC) are gaining importance because of their flexible structure, re-configurable property and simplicity of operation. Operation of MMC at low-switching frequency (LSF) helps in improved performance of the converter. This paper proposes an improved harmonics mitigation scheme for a Multilevel DC-Link Inverter (MLDCLI) which is a variant of MMC. The proposed scheme is a modified version of the conventional Nearest Level Modulation (NLM) scheme. It is termed as modified Nearest Level Modulation (mNLM) Scheme. The proposed scheme is effective compared to NLM because of the choice of the switching angles arrived by the use of the algorithm proposed. The MLDCLI topology is operated for twelve different configurations and mNLM is implemented on all the configurations. Using MATLAB software, the simulation results are validated and the same is extended to a hardware prototype. The effectiveness of the proposed scheme is evident by the reduced voltage THD, increased rms voltage, increased rms current and increased output power as compared to the conventional modulation scheme which is observed from the simulation and experimental results.A new approach for mitigating certain harmonics in a 5-level cascaded inverter is proposed, which involves adjusting the modulation index. The two switching angles 1 and 2 are calculated using a graphycal analysis approach that employs Chebyshev polynomials and Waring's formulas. According to standard code criteria, the suggested mitigation approach is used to lower a pair of harmonics in the inverter output voltage among the third, fifth, and seventh harmonics. The prototype created in the lab also extracts the outcomes of the experiments. The obtained findings substantiate the procedure's quality.

HarmonicMitigation Techniques in Modular Multilevel Inverter

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Abstract: The harmonic content of output voltage can be reduced by the output voltage from two or more inverters, can be combined by mean of transformer. The essential condition of this scheme is that the output voltage waveform from inverter must be similar but phase shifted from each other.A new approach for mitigating certain harmonics in a 5-level cascaded inverter is proposed, which involves adjusting the modulation index. The two switching angles 1 and 2 are calculated using a graphical analysis approach that employs Chebyshev polynomials and Waring's formulas. According to standard code criteria, the suggested mitigation approach is used to lower a pair of harmonics in the inverter output voltage among the third, fifth, and seventh harmonics. The prototype created in the lab also extracts the outcomes of the experiments. The obtained findings substantiate the procedure's quality.

Power quality Issues in distributed generation systems

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Abstract: Power quality can have a large detrimental effect on industrial processes and the commercial sector. Industrial processes differ in their requirements, from a power quality perspective, each having particular 'weaknesses' in terms of power quality attributes. The important power quality considerations to be accounted for to the industrial end-user centre around costs associated with machine down-time, clean-up costs, product quality and equipment failure. Solutions to power quality problems must be implemented by industrial end-users which reflect the cost versus benefit case for implementation.Having an inter-tie between low/medium voltage grid and distributed generation (DG), both exposes to power quality (PQ) problems created by each other. This paper addresses various PQ problems arise due to integration of DG with grid. The major PQ problems are due to unbalanced and non-linear load connected at DG, unbalanced voltage variations on transmission line and unbalanced grid voltages which severely affect the performance of the system. To mitigate the above-mentioned PQ problems, a novel integrated control of distribution static shunt compensator (DSTATCOM) is presented in this paper. DSTATCOM control helps in reducing the unbalance factor of PCC voltage. It also eliminates harmonics from line currents and makes them balanced. Moreover, DSTATCOM supplies the reactive power required by the load locally and hence, grid need not to supply the reactive power. To show the efficacy of the proposed controller, several operating conditions are considered and verified through simulation using MATLAB/SIMULINK.

Power Quality Assessment of Distorted Distribution Networks

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Abstract: In tandem with the offered technical, economic, and environmental benefits under a deregulated environment, the proliferation of not only power electronics supported consumption technologies, but also the expansion of renewable-based distributed generation (DG) systems has given rise to severe power quality (PQ) phenomena. The increased complexity of distribution power networks that will result from the inclusion of a significant number of DG units in the deregulated electricity market will undoubtedly make the PQ evaluation method time-consuming. In this paper, a PQ assessment of distorted distribution power networks with renewable-based DGs is provided using an analytic hierarchy process (AHP)-inspired technique.The proposed PQ assessment approach is based on formulating a unified power quality index (UPQI) for assessing the overall PQ performance of individual buses of the network along with the entire distribution network (DN) considered taking four PQ phenomena, viz. voltage harmonics, voltage sags, voltage unbalance and steady-state voltage profile at each bus into account. t. The application significance of the presented methodology is established by utilizing it on an IEEE 13 bus test distribution system modified through incorporating the nonlinear loads and DG systems based on three types of RES namely, photovoltaic (PV), wind and fuel cell, in MATLAB/Simulink environment.The obtained findings support the efficacy of the suggested technique in analysing the overall PQ performance of each bus and the whole DN, as well as benchmarking it against the unity threshold. On the basis of the obtained results, a comparison of the PQ performances of DN with three RES-based DGs is conducted. The influence of using custom power devices (CPDs) as well as an excessive amount of renewable energy penetration on the PQ performance of distribution networks is also evaluated using the developed index.