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In this issue

Member in the NEWS

Dr Krishna Kumar Gupta, FIE
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Dr K K Gupta is one of the Inventors for the Patent on the Topic "A Method of Preparation of Radar Absorbing Mesh Structured Fabric for 8-18 GHz Frequency" by India Patent Office. Details of the Patent is given below:

Patent Number: 339602
Date of Filing: 24/04/2014
Publication Date (U/S 11A): 30/10/2015
Date of Grant: 28/06/2020
Post Grant Journal Date: 03/07/2020
Grant Title: A Method of Preparation of Radar Absorbing Mesh Structured Fabric for 8-18 GHz Frequency
Field: Physics
Name of Grantee: Director General, Defence Research & Development Organisation (DRDO)
Grantee Address: Ministry of Defence, Government of India, DRDOBhawan, Rajaji Marg, New Delhi 110011, India
Name of Inventors: A K Saxena, Anurag Srivastava, S M Abbas, K K Gupta, Om Dev & Dur Vijay Singh

Abstract: *The invention relates to a method of preparation of radar absorbing mesh structured fabric for 8-18 GHz frequency, suitable for radar camoufl age applications, of the followingthe steps of (a) dispersing 5-20 wt% acetylene black and 5-20 wt% milled carbon fi bre in methyl ethyl ketone to form a dispersion; (b) mixing the dispersion, as obtained in step (a)in polyurethane solution under constant stirring; (c) homogenizing the mixed dispersion, as obtained in step (b), with magnetic stirring followed by sonication; (d) evaporatingmethyl ethyl ketone, at 80 to 100°C from homogenized mixed dispersion, as obtained in step (c), till a suffi ciently viscous solution suitable for coating purposes is obtained; (e)applying the viscous solution, as obtained in step (d), on a 3 mm mesh structured 60.0 -70.0 gsm polyester fabric using a knife over roller coating system; (f) curing the coatedfabric, as obtained in step (e), at 120°C for 3 min followed by further drying at 80-100°C for a period of 60-90 min.*

Dr Pundru Srinivasa Rao, FIE
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Dr Pundru Srinivas Rao received the **International Research Vibhushan Award 2021** from **ISSN** in the field of **Mechanical Engineering** on 15 August 2021 (https://oxfordresearchnews.com/2021/08/26/dr-pundru-srinivasa-rao/ and https://www.youtube.com/watchωv=SAQ0-lεG5tc)

Dr Nilaj N Deshmukh, FIE
Dean (Faculty) & Head
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Received **Best Researcher Award 2021-2022** from **Novel Research Academy**, Puducherry an autonomus research institute and registered enterprise under Government of India on 05 September 2021 for his academic contribution in **Science and Technology** under the category of "**Mechanical Engineering**".

Prof (Dr) Abhijit Mitra, FIE
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He has been awarded with the "**Dynamic Principal Award**" by FAMA Global Management Services and Asia Gulf Cooperation Council (Asia-GCC) for his "**excellence and leadership in education**" in December 2021

Member in the NEWS

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Patent granted to Dr R Balachandran on by Australian Government on "A Process for Fabricating a Multi-Layered Ceramic Capacitor"

Application Number:	AU 2021103000
Patent Application Type:	Innovation
Title:	A Process for Fabricating a Multi-Layered Ceramic Capacitor
Applicant(s):	Ruthramurthy Balachandran
Inventor(s):	Ruthramurthy Balachandran, H C Ananda Murthy, Tadesse Hailu Ayane, Gemechu Dengia Debela, Amanuel Abebe , Aschalew Tadesse
Filing Date:	2021-05-31
Application Status:	GRANTED

Abstract: *The present invention relates to a multi-layered ceramic capacitor and a process for fabricating the same. The process includes providing a first layer (102) having a thickness of 1000 pm and consisting of a copper substrate, pulse electrodepositing a second layer (104), having a thickness of 250 nm and consisting of nickel-iron alloy on said first layer (102), said nickel-iron alloy having nickel in the range of 80 wt.%, and iron in the range of 20 wt.%, depositing a third layer (106), having a thickness of 665 nm, and consisting of ZrO_2 doped $Ba_{0.5}Sr_{0.5}TiO_3$, by pulsed laser deposition process on said second layer (104), and depositing a fourth layer (108), having a thickness of 100 nm, and consisting of platinum, on said third layer (106). The capacitor has a dielectric constant of 700, a dielectric loss of 0.03, and a leakage current density of 30 nA/cm^2*

Publication by Members

Dr R Visvanathan, FIE
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Title of Paper:
Modification of a Cocoa Pod Divergent Grader

Agricultural Engineering International, CIGR, under VI-Postharvest Technology and Process Engineering section, Volume 23, No 4, December 2021, pp. 283–294, ISSN 1682-1130
DOI: https://cigrjournal.org/index.php/Ejounral/article/view/7049/3773
Co-author: Ashok Parish Yadav

Abstract: Grading the cocoa pods to uniform size is required to adjust the knife settings of the pod breakers and achieve improved performance. A gravity fed divergent roller type grader was developed for grading cocoa pods according to the breadth into six grades. Fiveround mild steel pipes of 40 mm outer diameter and 3 mm thickness for 1500 mm length were arranged with divergent of 65 to 100 mm between two rollers towards tail end with slope in the range of 22.5 to 25.5°. The grader, grades cocoa pods into six grades as, less than 70 mm, 70-80 mm, 80-85 mm, 85-90 mm, 90-100 mm and above 100 mm. The grader was evaluated for capacity and effectiveness at 22.5, 24 and 25.5° slopes of operation. The capacity of the grader and the effectiveness of grading are found significant with slope of operation. The capacity of the grader was 253.1, 268.9 and 277.7 kgh^{-1} at operating slopes of 22.5, 24 and 25.5°, respectively and the effectiveness of grader was 0.767, 0.787 and 0.745. Operating at 24° slope yielded the highest effectiveness of 0.787 and a capacity of 268.9 kgh^{-1}. According to these size grades of the pods, the breaking mechanism can be adjusted to achieve efficient pod breaking.

Keywords: Cocoa Pods, Size Distribution, Divergent Type Grader, Capacity, Effectiveness

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Title of Paper:
An Experimental Approach to find Aniline-Formaldehyde Co-Polymers as Effective Inhibitor on the Interface of Low Carbon Steel Immersed in 0.5N HCL Mixtures

Journal of the Indian Chemical Society, Elsevier, Volume 99, Issue 03, March 2022, Article ID 100356, Published Online: 13 January 2022, ISSN 0019-4522
DOI: https://doi.org/10.1016/j.jics.2022.100356
Co-authors: Prem Kumarbharti & Sudhish Kumarshukla

Abstract: The usefulness of aniline formaldehyde (AF), a modern water-soluble composite in 0.5 N hydrochloric acid as inhibitor of corrosion for mild steel, has been studied using weight reduction method, test of electrochemical impedance and potentiodynamic polarization methods. According to the findings by weight loss methods, 12 ppm of AF co-polymer at room temperature i.e. about 35° ± 1°C for 3h duration shows best performance on metal surface and exhibit 93.44% Inhibitor efficiency. The above said results has also being reviled from other examination methods, which shows that the AF follows the Langmuir isotherm, as well as the adsorption properties of the sampling supports the results as maximum IE of 95.05%, using EIS. The tafel and linear polarization results of maximum IE was found to be 94.81% and 94.96% respectively which was well aligned with an atomic force microscope (AFM) for surface morphology and found AF to be best suited corrosion inhibitor showing mixed type of nature, at defined parameter.

Keywords: Acid Corrosion, AFM, Aniline Formaldehyde, Electrochemical Calculations, Mild Steel, Polarization

Publication by Members

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Title of Paper:
Modeling of Renewable Energy Systems for Power Generation

International Journal of Engineering Applied Sciences and Technology (IJEAST), theme: Engineering — Renewable Energy, Published Online November 2021, Volume 6, Issue 7, pp 151-158 , ISSN No 2455-2143
URL: https://www.ijeast.com/papers/151-158,Tesma607,IJEAST.pdf
Co-author: Prashanth P Revankar

Abstract: Sustainable energy systems are termed as the systems which deliver energy and power, utilizing the Renewable and natural resources, which are cost effective and has an environmental concern. The Modeling of the systems and its components is itself a complex procedure. The basic Modeling through Physical law applied to each component of the system, its subsystem and the result of the overall system is more time consuming and requires thorough understanding of physical concept and the results obtained are more accurate. Alternatively, the Mathematical Modeling techniques or the procedures are simple to understand, easy to apply and more faithful in obtaining the useful results. This paper presents Various Mathematical Modeling of wind turbine and PV system and simulated for the faithfulness of the results. The deviations from the response of the models from the ideal model are represented as relative index. It shows that simple model can be accurate and it is useful in predicting the behavior of the system.

Keywords: Mathematical Modeling, Wind Turbine System, PV System

Er Soham Ghosh, AMIE
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Title of Paper:
The Texas Freeze of February 2021: Event and Winterization Analysis using Cost and Pricing Data

2021 IEEE Electrical Power and Energy Conference (EPEC), October 2021, pp 7-13, Electronic ISBN:978-1-6654-2928-3, Print on Demand (PoD) ISBN:978-1-6654-2929-0, Print on Demand (PoD) ISSN: 2381-2842
DOI: 10.1109/EPEC52095.2021.9621500
Co-authors: Arpit Bohra & Sreejata Dutta

Abstract: On February 2021, the winter storm Uri caused massive damages and economic losses upwards of $130 billion in Texas, worseneddue to a combination of multiple power grid-related events. Severe winter weather conditions caused several generation sources tofail, with a significant underperformance of natural gas-based generation, and eventually causing the overall state electric grid toreach under-frequency levels that could have resulted in catastrophic blackouts. During these few trying days, the natural gas pricespiked to exceed $400/MMBTU with a few delivery points reaching $1,250/MMBTU before falling back to the normal price levels ofunder $4/MMBTU. Real-time settlement point price for electricity spiked and hovered at $9,000/MWh price point for several days.The extreme price surges of these resources eventually caused large-scale financial fallouts in the event's aftermath. In the wake ofthe February event, conclusions have primarily been drawn towards to need for winterization of the Texas grid, improved scope forinformation sharing between state regulatory agencies, and an overall expansion of demand response resources. Alongside, theneed to rethink the scarcity pricing mechanism, the methods and cost of winterization of the state's electric grid/ natural gasinfrastructures and the necessity to improve the emergency response service program at the Energy Reliability Council of Texas(ERCOT) form the primary components of discussion in this paper.

Keywords: Uri, Texas Freeze, Scarcity Pricing, ERCOT, Winterization, Load Curtailment,winter Storm

Publication by Members

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Title of Paper:
Behavior of Internally Cured Self Compacting Concrete with Fly Ash under Ambient Curing Conditions

Romanian Journal of Materials, Volume 51, No 3, September 2021, pp. 464 - 471, ISSN 2457-502X, ISSN-L 1583-3186
URL: https://solacolu.chim.upb.ro/pg464-471.pdf
Co-authors: K Chinnaraju & V Jaganathan

Abstract: This research studies self compacting concrete mixes with 0, 30, 40 and 50% fly ash as replacement which are internally cured with super absorbent polymer and lightweight expanded clay aggregates against Self Compacting Concrete which are conventionally cured by submerging in water for a specific period. The optimum dose of the Internal curing agent was determined based on the chemical shrinkage of cement paste and it was presoaked in the mixing water and incorporated at the time of mixing. Fresh properties like slump cone, V funnel and L box tests were made and the effect of fly ash and internal curing agent was reported. Properties like compressive strength and durability factors such as rate of water absorption and resistance to chloride penetration were studied. Also the relationship between compressive strength and chloride penetration was established. It was found that the addition of fly ash seems to be beneficial for self curing concrete specimens up to 40% in terms of strength and durability. Concrete internally cured with super absorbent polymer showed better performance when compared with concrete cured with clay aggregates.

Keywords: Internal Curing, Self Compacting Concrete, Durability, Superabsorbent Polymer, Light Weight Expanded Clay Aggregate, Fly Ash, Curing

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Title of Paper
Study on Parameters Influencing the Properties of Self Compacting Concrete using Taguchi Optimization Method

Romanian Journal of Materials, Volume 51, No 4, December 2021, pp. 583 –563
URL: https://solacolu.chim.upb.ro/pg558-563.pdf
Co-author: K Chinnaraju

Abstract: This study aims at simplifying the process of mix design of Self Compacting Concrete (SCC) which is generally done through trial and error. Concrete being a heterogeneous material, the desired qualities are attributed to several factors, in addition SCC has the requirement of better workability, which leads to the complexity in the design process. In this paper, the various factors affecting the strength and workability of SCC such as Total Cementitious Material (TCM) content, water-cementitious material ratio, percentage of fly ash replacement, coarse aggregate content and fine aggregate content were analyzed with four different values for each factor. Based on the Taguchi optimization method, an orthogonal array with sixteen experiments was designed to obtain the best factors for the SCC mix. The performance parameters selected were slump flow value for flowing ability, T_{5min} of V funnel test for segregation resistance, L Box ratio for passing ability and compressive strength test for strength aspect. The results indicated that the TCM content and water-cementitious material ratio plays an important role in the workability of SCC, whereas TCM content and coarse aggregate content are predominant in the compressive strength of SCC.

Keywords: Self-compacting Concrete, Taguchi, Orthogonal Array, Fly Ash, Workability

Publication by Members

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Title of Paper:

Maximisation of Energy and Exergy Efficiencies for a Sustainable Thermoelectric Cooling System by Applying Genetic Algorithm

International Journal of Exergy, Volume 37, No.1, 24 December 2021, pp. 57-73
DOI: 10.1504/IJEX.2022.120108
Co-author: Pawan Kumar Singh Nain

Abstract: The efficient thermal management of thermoelectric cooler (TEC) as a sustainable coolingtechnology is important. The energy loss, electrical power requirement, and irreversibility of theTEC need to be minimised. Through this work, authors separately optimised TEC energyefficiency (ω_I) and exergy efficiency (ω_{II}) considering thermoelectric elements geometry andelectric current by using the genetic algorithm (GA). The effects of electrical contact resistanceand thermal resistance are considered in the mathematical model. Unlike previously reportedworks, the authors have used junction temperatures different from surface temperatures at therespective cold and hot sides of TEC. This study reveals that maximum energy and exergyefficiencies are obtainable at the same values of electric current, length, and cross-sectionalarea of thermoelectric elements. At cold surface temperature (T_c) of 20°C, the maximumenergy efficiency of 4.11 and the maximum exergy efficiency of 0.0715 are obtained. GA resultis validated through ANSYS® finite-element simulation.

Keywords: Thermoelectric Cooler, TEC, Energy Efficiency, Exergy Efficiency, Genetic Algorithm, Optimisation, Finite-element Simulation

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Title of Paper:

Potential of Moringa Oleifera Seed as a Natural Adsorbent for Wastewater Treatment

Trends in Sciences, Volume 19, Number 2, 15 January 2022
DOI: https://doi.org/10.48048/tis.2022.2019
Co-authors: Yashwant Aher & Anit Mandalik

Abstract: The present study deals with the appropriateness of the coagulation process using natural coagulant Moringa oleifera seed. Natural coagulants are useful for the treatment of wastewater because of its sustainability, cost-effectiveness, non-toxicity and lesser quantity of sludge formation. M.oleifera seed having a chemical composition of polypeptides having 6 amino acids like arginine acid, methionine acid, glutamic acid, phenylalanine, threonine, and histidine. M.oleifera is also known as a cationic polyelectrolyte and having molecular weight 6,000 to16,000 Dalton. The main objective of research work is the application of the M. oleifera seed as a natural adsorbent to treat synthetic dairy wastewater. The effects of pH, agitation time, the dose of sorbent and efficacy of M.oleifera seeds kernel for turbidity removal was assessed. M.oleifera seed eliminates turbidity 95% and colour 94% using 0.22 gm pod powder, and 0.2 L of 1.0 g/L synthetic dairy wastewater. Naturally dried M.oleifera seeds remove turbidity 95 %, sundried seeds remove turbidity 52% and oven-dried seeds 45%. As naturally dried M.oleifera pod having more surface area for adsorption and inter-particulate bridging which extract the extra active ingredients. pH range between 5 and 8 is more suitable to degrade the turbidity and colour. It is concluded that in the presence of an aqueous soluble cationic coagulant protein has great potential to remove the turbidity and colour of wastewater.

Keywords: Moringa Oleifera (M.oleifera), Bio-sorption, Chemical Oxygen Demand (COD), Turbidity, Coagulation

Publication by Members

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Title of Paper:
Microstructural Analysis of Copper Foil Etched and Annealed in ECR Plasma Reactor
Materials Science Forum, Volume 1048, January 2022, pp.121-129
DOI: https://doi.org/10.4028/www.scientific.net/MSF.1048.121
Co-Authors: Soumik Kumar Kundu, Aditya Mukherjee, Sujit Kumar Bandyopadhyay, Satyaranjan Bhattacharyya & Gouranga Sundar Taki

Abstract: Microstructural analysis of commercially available cold-rolled polycrystalline copper foil, etched and annealed in an in-house developed Electron Cyclotron Resonance (ECR) Plasma Enhanced Chemical Vapour Deposition (PE-CVD) reactor, have been carried out using x-ray diffraction (XRD) studies. The annealing experiments were carried out under a vacuum environment, keeping the working pressure of the reactor at 50×10^{-3} mbar, for three different time spans of 30 mins, 45 mins and 1 hour at 823 K (550°C) and 923 K (650°C) respectively in presence of hydrogen plasma. The XRD studies reveal the significance of annealing time at two different temperatures for the determination of physical and microstructural parameters such as the average grain size and micro-strain in copper lattice by Williamson-Hall (W-H) method.

Keywords:Annealing, Plasma Etching, Williamson-Hall, X-Ray Diffraction, PE-CVD

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Title of Paper
Aerodynamic Analysis of Cambered Blade H-Darrieus Rotor in Low Wind Velocity using CFD
Wind and Structures, Techno-Press, Volume 33, Issue 6, December 2021, pp. 471-480,
URL: http://www.techno-press.org/content/?page=article&journal=was&volume=33&num=6&ordernum=5
Co-authors: Agnimitra Biswas & Rajat Gupta

Abstract: This present paper leads to investigation of blade-fluid interactions of cambered blade H-Darrieus rotor having EN0005 airfoil blades using comprehensive Computational Fluid Dynamics (CFD) analysis to understand its performance in low wind streams. For several blade azimuthal angle positions, the effects of three different low wind speeds are studied regarding their influence on the blade-fluid interactions of the EN0005 blade rotor. In the prevailing studies by various researchers, such CFD analysis of H-Darrieus rotors are very less, hence it is needed to improve their steady-state performance in low wind velocities. Such a study is also important to obtain important performance insights of such thin cambered blade rotor in its complete rotational cycle. It has been seen that the vortex generated at the suction side of the EN0005 blade rolls back to its leading edge due to the camber of the blade and thus a peak velocity occurs near to the nose position of this blade at its leading edge, which leads to peak performance of this rotor. Again, in the returning phase of the blade, a secondary recirculating vortex is generated that acts on the pressure side of EN0005 blade rotor that increases the performance of this cambered EN0005 blade rotor in its downstream position as well. Here, the aerodynamic performances have been compared considering Standard k-ε and SST k-ω models to check the better suited turbulence model for the cambered EN0005 blade H-Darrieus rotor in low tip speed ratios.

Keywords: Blade-fluid Interaction, CFD Simulation, H-Darrieus Rotor, Lift Coefficient, Power Coefficient

Published Articles of IEI Journals

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Special Theme: **Advancements and Futuristic Trends in Mechanical & Materials Engineering**

Volume 103, Issue 1, February 2022

Title: **Foreword**
Author: **Gautam Biswas**, Editor-in-Chief
DOI: https://doi.org/10.1007/s40032-022-00825-9
Publication date: 21 February 2022
Pages: 1-1

Title: **Editorial**
Author: **Ravi Kant**, Guest Editor
DOI: https://doi.org/10.1007/s40032-022-00824-w
Publication date: 15 February 2022
Pages: 3-4

Title: **Investigations on the Effect of Sheets Positioning in Advancing & Retreating Side for Dissimilar FSW of DH36 Steel and Aluminum Alloy 6061**
Authors: **Pardeep Pankaj**, **Avinish Tiwari**, **Lakshmi Narayan Dhara**, **Sanjay Raj** & **Pankaj Biswas**: Department of Mechanical Engineering, Indian Institute of Technology Guwahati, Guwahati, India
DOI: https://doi.org/10.1007/s40032-021-00714-7
Publication date: 04 June 2021
Pages: 5-20

Title: **Analysis of Discharge Gap using Controlled RC based Circuit in µEDM Process**
Authors: **Sohaib Raza**, **Rahul Nadda** & **Chandrakant Kumar Nirala**: Department of Mechanical Engineering, Indian Institute of Technology Ropar, Punjab, India
DOI: https://doi.org/10.1007/s40032-021-00711-w
Publication date: 08 June 2021
Page: 21-27

Title: **Finite Element Modeling of Thermal Residual Stresses Generated during EDM of AISI 1018 Steel**
Authors: **Saurav Kumar**: Department of Mechanical Engineering, Dr APJ Abdul Kalam Technical University, Lucknow, India;
Sanghamitra Das & **Shrikrishna N Joshi**: Department of Mechanical Engineering, Indian Institute of Technology Guwahati, India
DOI: https://doi.org/10.1007/s40032-021-00695-7
Publication date: 23 April 2021
Page: 29–37

Title: **Processing and Properties of Biodegradable Composites to Strengthen Structures**
Authors: **D P Archana**, **H N Jagannatha Reddy**, **M U Aswath** & **A Chandrashekar**: Bangalore Institute of Technology, Bengaluru, India;
R Prabhakara: Visvesvaraya Technological University, Belagavi, Karnataka, India
DOI: https://doi.org/10.1007/s40032-021-00743-2
Publication date: 13 September 2021
Pages: 39–52

Title: **Numerical Computation and Analysis of Cutting Forces during Nanometric Scratching of Silicon Carbide**
Authors: **Borad M Barkachary**: Department of Mechanical Engineering, Jorhat Institute of Science and Technology,

Published Articles of IEI Journals

Jorhat, India;
Shrikrishna N Joshi: Department of Mechanical Engineering, Indian Institute of Technology Guwahati, India
DOI: https://doi.org/10.1007/s40032-021-00683-x
Publication date: 29 May 2021
Pages: 53–62

Title: **Microstructure and Microhardness of Mg/SiC Metal Matrix Composites Developed by Microwave Sintering**
Authors: **Shivani Gupta** & **Apurba Kumar Sharma**: Department of Mechanical and Industrial Engineering, Indian Institute of Technology Roorkee, Roorkee, India
DOI: https://doi.org/10.1007/s40032-020-00636-w
Publication date: 22 November 2020
Pages: 63–68

Title: **Optimization of Electroless Nickel Tungsten Composite Coating on 3D-Printed ABS Substrate for Maximum Tungsten Content**
Authors: **Mohemmed Suleman Noor Mohemmed Shaikh** & **Bharatkumar Bhagatraj Ahuja**: Department of Production Engineering and Industrial Management, College of Engineering Pune, India
DOI: https://doi.org/10.1007/s40032-020-00630-2
Publication date: 07 November 2020
Pages: 69–82

Title: **Loose Coupled Simulation Method for FEA of Electromagnetic Forming of Muffler**
Authors: **Sagar Pawar** & **Arup Nandy**: Department of Mechanical Engineering, Indian Institute of Technology Guwahati, Guwahati, India;
Sachin D Kore: School of Mechanical Sciences, Indian Institute of Technology Goa, Goa, India
DOI: https://doi.org/10.1007/s40032-020-00644-w
Publication date: 11 January 2021
Pages: 83–92

Title: **Determination of Material-Dependent Parameters and Friction in Ultrasonic-Vibration-Assisted Turning by Inverse Modeling**
Authors: **A Srivastav** & **V Yadav**: Department of Mechanical Engineering, Maulana Azad National Institute of Technology, Bhopal, India
DOI: https://doi.org/10.1007/s40032-022-00813-z
Publication date: 29 January 2022
Pages: 93–106

Title: **Analysis of Causes and Remedy of Chattering in the Aluminum Four stand Tandem Cold Rolling Mill: A Case Study**
Authors: **Vivek Anil Vaidya**: Department of Mechanical Maintenance Cold Mill, Maaden Rolling Mill, Ras Al Khair, Saudi Arabia;
Nalini Vivek Vaidya: Department of Applied Mathematics, G H Raisoni College of Engineering, Nagpur, India;
Vaishnav Vivek Vaidya: Government College of Engineering, Amravati, Maharashtra, India
DOI: https://doi.org/10.1007/s40032-021-00773-w
Publication date: 23 September 2021
Pages: 107–119

Title: **The Small Punch Test a Viable Alternate for In-service Components Preserved Strength Estimation**
Authors: **Pruthvish Patel**: Gujarat Technological University, Ahmedabad, India;
B K Patel: Mechanical Engineering Department, L D College of Engineering, Ahmedabad, India
DOI: https://doi.org/10.1007/s40032-021-00728-1
Publication date: 13 July 2021
Pages: 121–133

Title: **Designing Nanostructured Materials through Self-Assembly and their Applications**
Authors: **Hitasha Shahi**, **Jasveer Kaur** & **Sonalika Vaidya**: Institute of Nano Science & Technology, Punjab, India
DOI: https://doi.org/10.1007/s40032-021-00660-4
Publication date: 29 January 2021
Pages: 135–142

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(URL: *https://www.ieindia.org/webui/IEI-Publication.aspx#annual-technical-volume*).

Aerospace Engineering Division

Volume No 5

Theme : Small Satellites Initiatives in India

On the Theme :

The small satellite is envisaged to provide platform for stand-alone payloads, which facilitate earth imaging and science missions within a quick turnaround time. Small satellites are miniaturized satellites with wider range of users, all over the world. Small satellites have several advantages over large satellites namely cost effective ways to test newer technologies, opportunities for local industry, bigger basket of potential users and thus a large variety of mission possibilities. Small satellites are transforming the dynamics and economics of space industry and ensure that space technology is no longer monopolized by nations, but is accessible to smaller and newer entities. As a space-faring nation for over last five decades, India is set to become the hub for the small satellite launch market, which is projected to be valued a substantial amount in near future. Start-ups will be the key drivers in this space, with a few among them on the final stages of developing low-cost solutions that conform to global standards. The recent reforms by the Government of India will further accelerate private sector participation in the sector. Although small spacecraft have existed for decades, in recent years, small satellites have gained considerable importance, particularly in defense sectors, which have recently gained prominence owing to technological advances in their development and integration into the armed services of the major space faring countries across the world.

Sub-themes :

* Technological Innovations, Business Opportunities and Commercialization of Indian Space Industry
* Role of MSMEs and Start Ups in Small Satellite initiatives and development
* Cryogenic Engine Technology and Indian Space Market
* Design and Advancement in Satellite Launch Vehicle
* Business Initiatives for Components, Sub-assemblies and Spare Manufacturing in Aerospace Startups
* Provisions and Norms to initiate Start Ups and Entrepreneurship in Aerospace Sector

Type of Papers
- Original Contribution
- Case Study
- Article of Professional Interest

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Call for Papers

Electronics and Telecommunication Engineering Division

Volume No 5

Theme :

Recent Trends in Antenna Technology for Modern Wireless Communication

On the Theme:

Antenna design is an integral part of the communication system and plays a vital role in maintaining the quality of communication. Efficient antennas are employed as they are potentially responsible for the enhancement in system performance. These antennas have to perform critical activities that are required for efficient communication. The antennas have been successfully utilized in various sectors that include cellular communication systems, satellite communication links, military, defense, and health care services, and so on.

Sub-themes:

- Antenna Theory and Design
- Planar Antennas
- Broadband and Multiband Antennas
- Antenna Arrays
- Optical Antennas
- Smart Antennas and RF Sensors
- Wireless and Mobile communication
- Wireless Sensor Networks
- Wireless Security
- MIMO Systems Internet of Things
- Ad hoc & Mesh Networks
- 5G mobile Networking
- Any other related topics

Type of Papers
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- Article of Professional Interest

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Marine Engineering Division

Volume No 5

Theme :

Advancements in Ship Building Technology — Way Ahead towards New Normal

On the Theme :

The COVID-19 pandemic has underscored the global interdependency of nations and set in motion new trends, which is reshaping the maritime transport landscape. The Indian maritime sector is at a pivotal moment facing not only immediate concerns resulting from the pandemic but also longer-term considerations, ranging from shifts in supply-chain design and globalization patterns to changes in consumption and spending habits, a growing focus on risk assessment and resilience-building, as well as a heightened global sustainability and low-carbon agenda. The sector is also dealing with the knock-on effects of growing trade protectionism and inward-looking policies. The shipbuilding industry is now witnessing an unparalleled transformation with growing demand to build new vessels and expand geographic routes, tight budgetary measures, and most importantly, the need to deliver reliable designs at affordable costs. The shipbuilding industry is now characterized with complex value chain, which involves construction of large structures. Moreover, rising demand for flexible ships poses a challenge due to the traditional construction approach prevalent in the industry. In the presence of these demanding market requirements, advanced technologies such as Industrial Internet of Things (IIoT) plays a crucial role in modernizing fleets in a cost-effective manner and also within a shorter time span. IIoT addresses various constraints pertaining to capital allocation, design, and build, and more importantly, supports optimal utilization of vessels during the commissioning and decommissioning phase of new and existing ships.

Sub-themes :

* Technological Advancement in Shipping Industry in New Normal
* Global Recovery in Shipping in New Normal: The Way forward
* Maritime Industry 4.0
* Digital Transformation of Ship Building Industry – The Way Ahead
* Advancements in Shipbuilding Value Chain
* Reorientation of post pandemic marine workforce and Seafarers

Type of Papers
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Mechanical Engineering Division

Volume No 6

Theme :

Applications of Artificial Intelligence and Machine Learning in Mechanical Engineering — The Post Pandemic Pathway

On the Theme :

Amidst the ongoing global crisis, the engineers, scientists, and professionals have so far played a stellar role and have constantly scaling up their efforts and have been responsive to the challenges posed by the COVID-19 pandemic. The application of Machine Learning (ML) and Artificial Intelligence (AI) during the first wave of pandemic encouraged the researchers to outline new angles to explore different fields of mechanical engineering contributing to uninterrupted industrial growth of the country. The rapid advancements in the field of fluid mechanics leads to, unprecedented volumes of data driven experiments, field measurements, and large-scale simulations at multiple spatiotemporal scales. Moreover, Machine Learning algorithms can augment domain knowledge and automate tasks related to flow control and optimization. Tribology is another area which has been empowered with AI, ML, Big Data tools and led to evolution of '**Tribo-informatics / Intelligent Tribology**'. As we embrace the new normal, most of the facets of mechanical engineering will be data driven and AI and ML need to be vectored in to optimize workspace, product and services.

Sub-themes :

* Study of IC Engine in light of Artificial Intelligence (AI) and Machine Learning (ML)
* Design, Operation and Maintenance of Turbine: A Machine Learning Approach
* Advancement in Boiler Design, Operation & Maintenance through AI and ML Approach
* Advancement in Machine Design through AI and ML Approach
* Advances in Thermodynamics and Heat Transfer: The Machine Learning Approach
* Neural Network in Kinematics: Challenges and Opportunities
* Predictive Maintenance and Failure Analysis: AI and ML Approach
* Tribology and Condition Monitoring: Supervised and Unsupervised Learning Approach
* Fluid Mechanics and Heat Transfer: A Data Driven Approach
* Application of Machine Learning in Mechanical System Modeling and Simulation
* Assessment of Behaviours of Mechanical Systems through AI and ML
* Machine Installation and Commissioning through Machine Learning Approach
* Artificial Intelligence based Heating, Ventilation and Air Conditioning
* Application of Artificial Intelligence in Oil and Gas Industries
* Bio-medical Engineering: A Machine Learning Approach

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- *Case Study*
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Metallurgical & Materials Engineering Division

Volume No 5

Theme :

Integrated Computational Materials Engineering

On the Theme :

Integrated computational materials engineering (ICME) is an emergent field that aims to integrate computational materials science tools into a holistic system that can accelerate materials development, transform the engineering design optimization process, and unify design and manufacturing. Even though in its nascent state, ICME presents a grand challenge laden with prospects of achieving significant economic benefit and accelerate innovation in the engineering of materials and manufactured products. Papers from eminent engineers and technologists on contemporary issues having technical relevance to the theme shall be included in this volume. It is expected that the articles will be of academic values, and reflect experience of professional engineers.

Sub-themes :

* Computer Simulations at Different Time Scales,
* Multi scale Aspects of Materials,
* Creating Newer Materials,
* Thermodynamics of Materials Engineering,
* Principles of Engineering Practice,
* Fundamentals of Materials Science and Engineering,
* Electronic Structure Theory and Methods,
* Applications of First-Principles Methods,
* Molecular Dynamics (MD),
* Material Structures using Finite Element Methods (FEM);
* Crystal Plasticity Theory etc.

Type of Papers
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- *Case Study*
- *Article of Professional Interest*

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Mining Engineering Division

Volume No 4

Theme :

Future of Mining

On the Theme :

The evolution of technology, from advanced data analytics to artificial intelligence (AI), has always had the potential to transform the mining industry by realizing operational efficiency improvements, enhancing productivity, improving safety performance, empowering employees to do more meaningful work, and allowing communities to be more prosperous. The COVID-19 crisis has exposed the siloed nature of mining companies and highlighted the need for integrated operations. This is likely to accelerate the adoption of digital technologies, artificial intelligence, and analytics in the mining industry. This volume will discuss what future has in store for the mining sector and the likelihood of vectoring in the intelligent, integrated operations in mining in a comprehensive manner. Papers from eminent engineers, technologists, professionals and researchers on contemporary issues having technical relevance to the theme shall be included in this volume.

Sub-themes :

* Climate-Smart Mining
* Responsible Sourcing (Decrease environmental footprint, Increase social footprint)
* Adoption of low carbon product strategies
* Collaboration to set new mining standards based on environmental, social and governance (ESG) principles
* Digitalization for more sustainable use of resources & lowering input cost
* Automation for enhancing productivity
* Smart mine power distribution and energy management
* New frontiers: deep sea, space exploration
* Resilient Mining Practices

Type of Papers
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Production Engineering Division

Volume No 6

Theme :

Applications of Machine Learning, Deep Learning and Artificial Intelligence in Manufacturing — The Way Forward

On the Theme :

The advent of fourth industrial revolution ushered in huge industrial reforms and a paradigm shift in manufacturing from conventional product oriented labour intensive approach to a customer oriented data driven one and reinstated that promoting digital innovations coupled with intelligent decision making is the way forward. With the introduction of IIoT, Digital Twins, Smart Factories, Cyber-Physical Systems, Indian manufacturing sector has created a niche for itself in terms of productivity, efficiency and overall growth. Smart manufacturing revolution has enabled the manufacturing units to achieve timeless manufacturing goal with the objective to produce products with stated degree of precision and accuracy in a cost effective manner. In this context, Artificial Intelligence and Machine Learning are the core technologies which have provided stimulus for this transformation. These technologies, leveraged by Industry 4.0, namely Internet of Things, Advanced Embedded Systems, Cloud Computing, Big Data, Cognitive Systems, Virtual and Augmented Reality needs to be leveraged further as we prepare ourselves for adopting a newer, resilient and a self-reliant manufacturing eco-system.

Sub-themes :

* Data Driven Decision Making in Production Planning and Control
* Advances in Machine Tools: Artificial Intelligence and Deep Learning Approach
* Assessment of Industrial Automation in Machine Learning Environment
* Deep Learning and Smart Manufacturing – The Way forward
* Application of Big Data Analytics in Manufacturing
* Smart Warehousing, Warehouse Optimization and Inventory Management
* Artificial Intelligence and Robotics in Welding Industry
* Lean and Agile Supply Chain: Machine Learning Approach
* Digital Fabrication and 3D Printing
* Industry 4.0 and Project Management: The Way Forward
* Business Analytics and Knowledge Management
* Assessment of System Reliability, Availability and Maintainability through Machine Learning Approach

Type of Papers
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- *Case Study*
- *Article of Professional Interest*

submit your articles to:
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Call for Papers

Textile Engineering Division

Volume No 5

Theme :

Development and Application of Functional Textiles

On the Theme :

Functional textiles, as we all know, are textiles with integrated functions of controlling or adjusting according to its application area. Functional textiles, over the years, have developed a niche for itself in textile industry and the associated fraternity. This range includes breathable, heat and cold-resistant materials, ultra-strong fabrics (e.g. as reinforcement for composites), new flame retardant fabrics (e.g. intumescent materials), optimized textile fabrics for acoustic properties, etc. Functional textiles became more and more important materials for various applications and interest in them grew year by year. Papers from eminent engineers, technologists, professionals and researchers on contemporary issues having technical relevance to the theme shall be included in this volume. It is expected that the articles will be of academic values, and will provide a comprehensive coverage of the subject.

Sub-themes :

The said volume will cover major sectors of Development and Application of Functional Textile, and will accommodate manuscripts on the following genre:

* Based on the type of garment
  - Active wear
  - Performance wear
  - Ready to wear
  - Seamless wear
* Based on the type of fiber
  - Polyester and advancements
  - Viscose
* Based on the type of functions
  - Anti-bacterial
  - UV-protection
  - Temperature regulating
  - Water and oil repellent
* Based on the application area
  - Geotextiles
  - Personal Protection
  - Medical
  - Hygiene
  - Sports and Leisure
  - Military/ war
  - Industrial textiles

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Nota BENE

We would like to thank our erudite members for sharing their professional achievements through the IEI Epitome and making the content more abounding and at the same time inspiring many others to share their accomplishments as well. To streamline the process and make it convenient for the member to give their inputs we would like to obtain the information in a more structured and comprehensive manner. We would request our members to send the details of their achievements as per the appended formats only.

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Like every year, the Institution invites applications for the session 2022-2023 for funding industry-oriented R&D projects and research initiatives aimed at improving the life-style of common people from engineering students pursuing full time Diploma/UG/PG/PhD engineering program in AICTE/UGC/NAAC approved Institutions/Colleges/Universities. The application form and guidelines are available in our website **https://www.ieindia.org**. The projects should be carried out under the guidance of faculty members who are Corporate Members of IEI. Membership criteria for student(s), guide(s) and Institution(s) are as follows:

Project Category	Student/Applicant Membership	Guide(s) Membership	Institutional Membership
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2. UG (BE/BTech/ AMIE/Equivalent)	'Student Member' (SMIE)	AMIE/MIE/FIE	Applicant's Institute should preferably be an Institutional Member with NBA / NAAC Accreditation or valid NIRF Rank
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Director (Technical)
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