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SR. NO – 1

Enabling Technologies for Effective Planning and Management in Sustainable Smart Cities

IoT and an Intelligent Cloud-Based Framework to Build a Smart City Traffic Management System

Ashish Sharma

https://link.springer.com/book/10.1007/978-3-031-22922-0

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Enabling Technologies for Effective Planning and Management in Sustainable Smart Cities

Editors: Mohd Abdul Ahad, Gabriella Casalino, Bharat Bhushan

This book provides the basic knowledge about smart cities, its components and challenges in its effective realization

This book sheds light on the know-how about the role of enabling technologies in effective management of smart cities to make them a better abode for the inhabitants

The book explores various enabling technologies like Information Communication Technology (ICT), edge computing, AI, NLP, IoT, blockchain, and cloud computing

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Sections

Table of contents
About this book
Keywords
Editors and Affiliations
About the editors
Bibliographic Information
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Table of contents (16 chapters)

Search within book

Front Matter PDF
Pages i-xiv

Challenges and Opportunities in Secure Smart Cities for Enhancing the Security and Privacy
Sameeka Saini, Abhilasha Chauhan, Gesu Thakur, Luxmi Sapra
Pages 1-27

Reliability and Security of Edge Computing Devices for Smart Cities
Nikunj Pansari, Rishit Saiya
Pages 29-52

Artificial Intelligence in Smart City-Systematic Literature Review of Current Knowledge and Future Research Avenues
A. K. M. Bahalul Haque, Anjoom Nur, Raisa Nusrat Chowdhury
Pages 53-77

Predictive Farmland Optimization and Crop Monitoring Using Artificial Intelligence

Techniques

Antara Sahoo, Aniket Rathi, Shambhavi Bashishth, Sanghamitra Roy, Chittaranjan Pradhan
Pages 79-121

Natural Language Processing (NLP) Based Innovations for Smart Healthcare Applications in Healthcare 4.0

Nemika Tyagi, Bharat Bhushan
Pages 123-150

Evolving of Smart Banking with NLP and Deep Learning

Bibhu Dash, Swati Swayamsiddha, Azad I. Ali
Pages 151-172

Blockchain Based Smart Card for Smart City

Kazi Tamzid Akhter Md Hasib, Rakibul Hasan, Mubasshir Ahmed, A. K. M. Bahalul Haque
Pages 173-202

Blockchain-Powered Smart E-Healthcare System: Benefits, Use Cases, and Future Research Directions

Ayasha Malik, Bharat Bhushan, Veena Parihar, Lamia Karim, Korhan Cengiz
Pages 203-228

A Comprehensive Review of Wireless Medical Biosensor Networks in Connected Healthcare Applications

Duaa Alhusein, Ali Kadhum Idrees
Pages 229-244

Smart Intelligent System for Cervix Cancer Image Classification Using Google Cloud Platform

P. Subashini, T. T. Dhivyaprabha, M. Krishnaveni, M. B. Jennyfer Susan
Pages 245-281

[IoT and an Intelligent Cloud-Based Framework to Build a Smart City Traffic Management System]

Saroja Kumar Rout, Bibhuprasad Sahu, Pradyumna Kumar Mohapatra, Sachi Nandan Mohanty, Ashish K. Sharma
Pages 283-302

[Emersion and Immersion of Technology in the Development of Smart Cities: A Bibliometric Analysis]

Manisha Gupta, Bhawna Choudhary, Deergha Sharma
Pages 303-318

[Examining Social Media, Citizen Engagement and Risk Communication: A Smart City Perspective]

Tamanna Dalwai, Menila James, Nujood Al Haddabi, William Webster, Abdullah Mohammed Alshukaili, Arockiasamy Soosaimanickam
Pages 319-333

[5G and 6G Technologies for Smart City]

Sonia Chhabra, Manpreet Kaur Aiden, Shweta Mayor Sabharwal, Mustafa Al-Asadi
Pages 335-365

[Software Defined Virtual Clustering-Based Content Distribution Mechanism in VNDN]

Anu Sharma, Deepanshu Garg, Shilpi Mittal, Rasmeet Singh Bali
Pages 367-387

[Sustainable Energy Usage in Urban and Rural Context-A Study]

Sonali Vyas, Shaurya Gupta, Vinod Kumar Shukla
Pages 389-402

Back to top ↑

About this book

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Menu Search Cart

Enabling Technologies for Effective Planning and Management in Sustainable Smart Cities pp 283–302

IoT and an Intelligent Cloud-Based Framework to Build a Smart City Traffic Management System

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Chapter | First Online: 26 February 2023

314 Accesses | **1** Citations

Abstract

Congestion is a major issue in all metropolitan cities, particularly in urban areas. Using smart technologies, Cities may be extraordinary and can be transformed into “smart cities”. The Internet of Things (IoT) is a new paradigm in computing that seems to have the capacity to enhance impact in smart city implementation. For smart cities, IoT and cloud-based road traffic technologies are proposed in this article. The overarching goal is to use cloud computing to resolve some of the IoT’s present issues and limits to create upgraded solutions for smarter cities. With the

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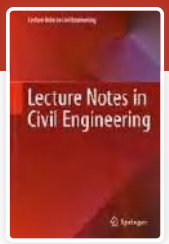

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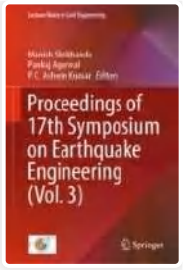

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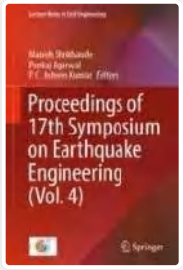

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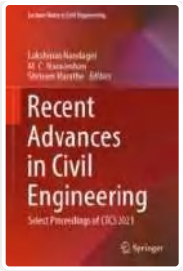

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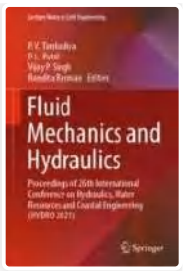

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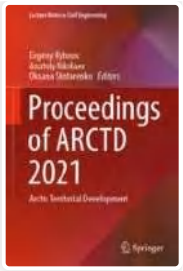

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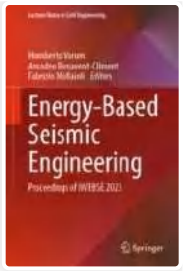

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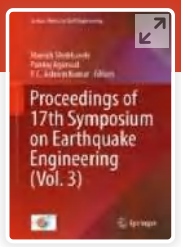

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Sections

Table of contents

Other volumes

About this book

Keywords

Editors and Affiliations

About the editors

Bibliographic Information

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Table of contents (61 papers)

Behavior of Monopiles for Offshore Wind Turbines in Clayey Soil for Gulf of Khambhat Region

R. Singh Sujawat, R. Kumar
Pages 513-523

Linear Spring Constants of Soil for Pile Groups for the Nuclear Power Plants

Mohd Firoj, B. K. Maheshwari
Pages 525-531

Three-Dimensional Slope Stability Under Bi-Directional Pseudo-Static Seismic Load

V. Sharma, D. Raj, R. Gupta
Pages 533-543

Strength of Masonry Infill RC Frame Influenced by Weak and Strong Type RC Frames

Kaushal P. Patel, R. N. Dubey
Pages 545-553

Drained and Undrained Response of Fully Saturated Specimen in Resonant Column Tests Subjected to Large Number of Torsional Vibrations

Ninad Sanjeev Shinde, Jyant Kumar
Pages 555-564

Development of Application Software for Lateral and Vertical Load Carrying Capacity of Piles

Aditya Patil, Shrabony Adhikary
Pages 565-577

Numerical Analysis of a Rigid Wall Retaining Soil Reinforced with C&D Waste

A. R. Prajapati, H. M. Rangwala
Pages 579-588

Seismic Analysis of Railway Track

A. S. Ghogre, H. D. Phadke, O. R. Jaiswal
Pages 589-607

Time Series Analyses of Bhatwari Landslide Triggered by the 1991 Uttarkashi Earthquake

Neha Gupta, Josodhir Das, D. P. Kanungo
Pages 609-618

Importance of Multiple Geophysical Tests for Effective Subsurface Profiling

Ravinesh Kumar, P. Anbazhagan, Ayush Kumar
Pages 619-628

Dynamic Characterization and Ground Response Analysis of Clay Soil Profiles

K. Rangaswamy

Pages 629-639

Effect of Vibration Induced by Dynamic Tests on an Adjacent Building—Finite Element Investigations

M. Bharathi, Dhiraj Raj, R. N. Dubey
Pages 641-653

Liquefaction Susceptibility of Bottom Ash Under Cyclic Loading

L. Abhijith, K. Rangaswamy, Renjitha Mary Varghese
Pages 655-666

Soil-Structure Interaction Effect on a Multi-storied Building with Pile Foundation Considering Linear Approach

S. Banerjee, K. Bhattacharya
Pages 667-679

Geotechnical Characterization of Natural Sub-Base and Subgrade Material for Pavements

A. Kumar, S. K. Kumawat, M. Jain, S. Dangayach, D. Raj, H. K. Sharma
Pages 681-694

Response of a Nuclear Containment with Soil Underneath Under Earthquake Excitation

Charity Marbaniang, Kamal Bhattacharya
Pages 695-708

Numerical Simulation of a Laminar Soil Box to Study Seismic SSI Effects of Nuclear Facilities

R. Banerjee, S. Bandyopadhyay, Y. M. Parulekar, J. Chattopadhyay
Pages 709-722

Numerical Derivation of Pressure-Impulse Diagrams for a Fixed-End RC Beam Subjected to Blast Loads

Ravi Mudragada, Ankit Agrawal, Pradeep Bhargava
Pages 723-733

[Seismic Evaluation of Building Having Steel-Concrete Composite Columns and RC Beams]

R. C. Mukhedkar, A. P. Khatri
Pages 735-746

[Chaos Game Representation of Indian Plate Seismicity]

Cyril Shaju, Kamal Kamal
Pages 747-755

← Previous Page 3 of 4 Next →

Back to top ↑

Other Volumes

1. Proceedings of 17th Symposium on Earthquake Engineering (Vol. 1)
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Back to top ↑

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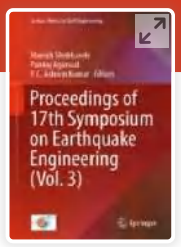

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Abstract

In the past earthquakes, there are quite a few instances wherein railway tracks got damaged. There are also instances when train (coach) got derailed either in stationary or running conditions like in the Tangshan Earthquake of July 1976, when nine trains were overturned and derailed (Esmaeili and Noghabi in J. Transp. Eng. 139(7):697–708, [1]). There are many studies on dynamic response of railway tracks to moving loads; however, there are very few studies on seismic response of railway tracks. Particularly, the lateral seismic response of ballasted track is not properly understood Sogabe et al. (Q. Rep. RTRI. 54(2):104–111, [2]). In the present study, seismic

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Computational Intelligence In Manufacturing

An approach for machining curve cooling hole in plastic injection mold

Vikas Gohil

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Table of contents

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Book chapter ○ Abstract only

Chapter One - Multiverse multiobjective optimization of thinning and wrinkling in automotive connector

Ganesh M. Kakandikar, Vilas M. Nandedkar and Omkar K. Kulkarni
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Index

Pages 201-205

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Chapter Two - An approach for machining curve cooling hole in plastic injection mold

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Abstract

In this chapter, a curved hole machining mechanism is developed on z-axis numerical control (ZNC) electrical discharge machine (EDM). The unique mechanism operates through the computer intelligence programmable electronic control systems (ECS). The experimental methodology is identified with three distinct workpiece materials and curved copper tool. The result analysis of curved hole machined is evaluated in four categories. First, the maximum material removal rate (MRR) and minimum tool wear rate (TWR) were estimated at 51.304 mm^3/min and 0.3 mm^3/min, respectively. Second, the mean dimensional accuracy of the machined curved hole with the designed curved hole is found in pilot experimentation (96.87%). Third, the output belongs to the surface roughness, which is achieved in P20 mold steel material (4.609 μm), followed by material characterization using scanning electron microscopy (SEM). The developed machining mechanism has been successfully experimented and validated by derived results.

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DC Micro grid - Advances, Challenges, and Applications

Passive Islanding Detection Method using Static Transfer Switch for Multi-DGs Microgrid

Rahul Somalwar

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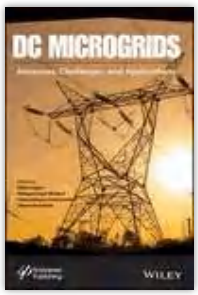

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First published: 25 May 2022
Print ISBN: 9781119777168 | Online ISBN: 9781119777618 | DOI: 10.1002/9781119777618
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About this book

DC MICROGRIDS

Written and edited by a team of well-known and respected experts in the field, this new volume on DC microgrids presents the state-of-the-art developments and challenges in the field of microgrids for sustainability and scalability for engineers, researchers, ... Show all

Table of Contents

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Front Matter (Pages: i-xviii)

Summary | PDF | Request permissions

CHAPTER 1

On the DC Microgrids Protection Challenges, Schemes, and Devices - A Review (Pages: 1-62)

Mohammed H. Ibrahim, Ebrahim A. Badran, Mansour H. Abdel-Rahman

Summary | PDF | References | Request permissions

CHAPTER 2

Control Strategies for DC Microgrids (Pages: 63-81)

Bhabani Kumari Choudhury, Premalata Jena

Summary | **PDF** | **References** | **Request permissions**

CHAPTER 3

Protection Issues in DC Microgrids (Pages: 83-100)

Bhabani Kumari Choudhury, Premalata Jena

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CHAPTER 4

Dynamic Energy Management System of Microgrid Using AI Techniques: A Comprehensive & Comparative Study (Pages: 101-120)

Priyadarshini Balasubramanyam, Vijay K. Sood

Summary | **PDF** | **References** | **Request permissions**

CHAPTER 5

Energy Management Strategies Involving Energy Storage in DC Microgrid (Pages: 121-157)

S. K. Rai, H. D. Mathur, Sanjeevikumar Padmanaban

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CHAPTER 6

A Systematic Approach for Solar and Hydro Resource Assessment for DC Microgrid Applications (Pages: 159-182)

Sanjay Kumar, Nikita Gupta Mathur, Vineet Kumar, Tarlochan Kaur

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CHAPTER 7

Secondary Control Based on the Droop Technique for Power Sharing (Pages: 183-240)

Waner W.A.G. Silva, Thiago R. de Oliveira, Rhonei P. Santos, Danilo I. Brandao

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CHAPTER 8

Dynamic Analysis and Reduced- Order Modeling Techniques for Power Converters in DC Microgrid (Pages: 241-272)

J. Divya Navamani, A Lavanya, Jagabar Sathik, M.S. Bhaskar, K. Vijayakumar

Summary | PDF | References | Request permissions

CHAPTER 9

Matrix Converter and Its Probable Applications (Pages: 273-298)

Khaliqur Rahman

Summary | PDF | References | Request permissions

CHAPTER 10

Multilevel Converters and Applications (Pages: 229-324)

P. Prem, Jagabar Sathik, K.T. Maheswari

Summary | PDF | References | Request permissions

CHAPTER 11

A Quasi Z-Source (QZS) Network-Based Quadratic Boost Converter Suitable for Photovoltaic-Based DC Microgrids (Pages: 325-360)

Amir Ghorbani Esfahlan, Kazem Varesi

Summary | PDF | References | Request permissions

CHAPTER 12

Research on Protection Strategy Utilizing Full-Scale Transient Fault Information for DC Microgrid Based on Integrated Control and Protection Platform (Pages: 361-396)

Shi Bonian, Sun Gang

Summary | PDF | References | Request permissions

CHAPTER 13

A Decision Tree-Based Algorithm for Fault Detection and Section Identification of DC Microgrid (Pages: 397-420)

Shankarshan Prasad Tiwari, Ebha Koley

Summary | PDF | References | Request permissions

CHAPTER 14

Passive Islanding Detection Method Using Static Transfer Switch for Multi-DGs Microgrid (Pages: 421-448)

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Chapter 14

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Summary

The designing and controlling of the microgrid in both modes, stand-alone mode and utility-connected mode, is a central concern. After main grid interruption and resynchronization with the grid, the power sharing is an interesting task. Similarly, in a single-phase inverter-based microgrid, the islanding occurs during grid dis-connection, which is one of the important aspects.

In this paper, appropriate relay management in a single-phase system is projected for islanding and active power allocation in between multi-distribution generations (DGs) units. Micro-switch acting as a relay is used here for disconnection and synchronization of DGs by using Static Transfer Switch (STS). There are several types of islanding detection methods (IDM) out of these passive islanding methods that are competent, financially cheaper and easily implemented; however, they have large non-detection zones (NDZ). The conventional passive islanding methods are unable to sense islanding conditions when the generating power is approximately equal to load power. In this paper, various passive and active islanding methods are discussed along with their merits and demerits, and individual lower-order harmonics are investigated along with STS, which, as a new effective passive islanding method, is proposed for the inverter centered utility connected system. This scheme can be properly useful along with the existing passive methods. The proposed method overcomes the limitation of the passive method and has a benefit that it is able to reduce the Non-Detection Zone (NDZ). The test result of simulation and experimental set up is analyzed, which fulfills the requirement of IEEE 1547 standards.

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Ashish K Sharma

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TABLE OF CONTENTS

Chapter

Blockchain Technology

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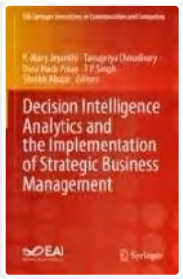

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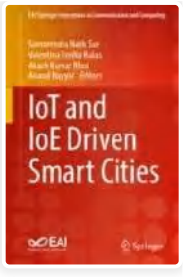

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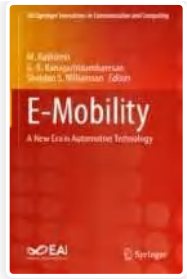

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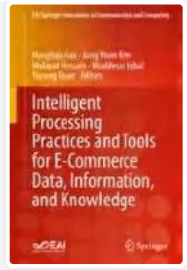

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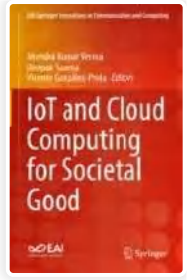

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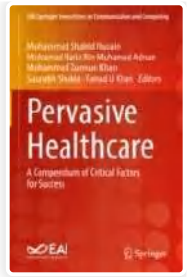

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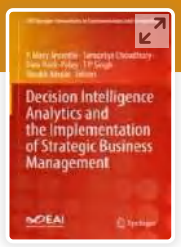

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Table of contents

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Table of contents (19 chapters)

Search within book

← Previous Page 1 of 2 Next →

Front Matter PDF
Pages i-xix

Analytics Techniques: Descriptive Analytics, Predictive Analytics, and Prescriptive Analytics
Ashish K. Sharma, Durgesh M. Sharma, Neha Purohit, Saroja Kumar Rout, Sangita A. Sharma
Pages 1-14

A Complete Overview of Analytics Techniques: Descriptive, Predictive, and Prescriptive
Debashish Roy, Rajeev Srivastava, Mansi Jat, Mustafa Said Karaca
Pages 15-30

Artificial Intelligence and Analytics for Better Decision-Making and Strategy Management
Neelaksh Sheel, Lal Pratap Verma, Somesh Kumar, T P Singh
Pages 31-43

[Artificial Intelligence: Game Changer in Management Strategies]

Om Prakash Gusai, Ankur Rani
Pages 45-52

[Prospects and Future of Artificial Intelligence (AI) in Business Strategies]

Shekhar Chandra Joshi, Yougal Joshi
Pages 53-67

[Artificial Intelligence: Technologies, Applications, and Policy Perspectives. Insights from Portugal]

Maria José Sousa, Francesca Dal Mas, Gabriel Osório de Barros, Nuno Tavares
Pages 69-84

[The Rise of Decision Intelligence: AI That Optimizes Decision-Making]

P. Mary Jeyanthi, Dieu Hack Polay, Tanupriya Choudhury
Pages 85-92

[A Survey on Analytics Technique Used for Business Intelligence]

P. Dhivya, A. Karthikeyan, J. Ajayan, S. Vigneshwaran
Pages 93-98

[Decision Intelligence Analytics: Making Decisions Through Data Pattern and Segmented Analytics]

Bikram Pratim Bhuyan, Jung-Sup Um, T P Singh, Tanupriya Choudhury
Pages 99-107

[Amalgamation of Business Intelligence with Corporate Strategic Management]

Adham Kahlawi
Pages 109-123

[Role of Decision Intelligence in Strategic Business Planning]

Syed Arslan Haider, Shehnaz Tehseen

Pages 125-133

[Social and Web Analytics: An Analytical Case Study on Twitter Data]

Hitesh Kumar Sharma, Tanupriya Choudhury, Hussain Falih Mahdi
Pages 135-143

[People Analytics: Augmenting Horizon from Predictive Analytics to Prescriptive Analytics]

Anurag Singh, Hardeep Singh, Ashutosh Singh
Pages 145-153

[Machine Learning Based Predictive Analytics: A Use Case in Insurance Sector]

Hitesh Kumar Sharma, Tanupriya Choudhury, Teoh Teik Toe
Pages 155-162

[Machine Learning Applications in Decision Intelligence Analytics]

Sanika Singh, Aman Anand, Saurabh Mukherjee, Tanupriya Choudhury
Pages 163-178

[Demystifying Behavioral Biases of Traders Using Machine Learning]

Hardeep Singh, Anurag Singh, Era Nagpal
Pages 179-188

[Real-Time Data Visualization Using Business Intelligence Techniques in Small and Medium Enterprises for Making a Faster Decision on Sales Data]

Owes Quruny Shubho, Zerin Nasrin Tumpa, Walid Ibna Rakib Dipto, Md Rasel Alam
Pages 189-198

[To Invest or Not to Invest? A Case Study with Decision Analytics on Japanese Yen]

Swamynathan Ramakrishnan, Sredharran Sampath, Prannav Srikanth, A. Mansurali
Pages 199-205

[Broca's Area of Brain to Analyze the Language Impairment Problem and Behavior Analysis of Autism]

Md Ashiqul Islam, Rafat Karim, Faruq Ahmed, Maksuda, Md Sagar Hossen, Shamima Akter
Pages 207-220

← Previous Page 1 of 2 Next →

Back to top ↑

About this book

This book presents a framework for developing an analytics strategy that includes a range of activities, from problem definition and data collection to data warehousing, analysis, and decision making. The authors examine best practices in team analytics strategies such as player evaluation, game strategy, and training and performance. They also explore the way in which organizations can use analytics to drive additional revenue and operate more efficiently. The authors provide keys to building and organizing a decision intelligence analytics that delivers insights into all parts of an organization. The book examines the criteria and tools for evaluating and selecting decision intelligence analytics technologies and the applicability of strategies for fostering a culture that prioritizes data-driven decision making. Each chapter is carefully segmented to enable the reader to gain knowledge in business intelligence, decision making and artificial intelligence in a strategic management context.

Back to top ↑

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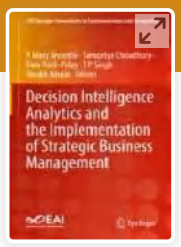

Decision Intelligence Analytics and the Implementation of Strategic Business Management pp 1–14

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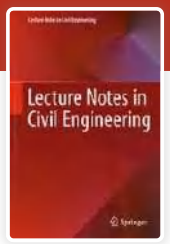

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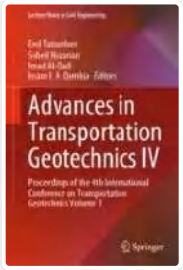

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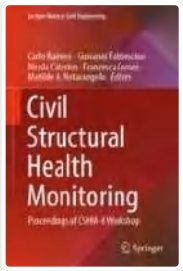

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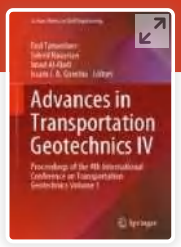

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Table of contents

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Table of contents (74 papers)

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← Previous Page 4 of 4 Next →

Stabilization and Reinforcement of Geomaterials and Its Implications in Pavement and Rail Track Design

Experimental Study on Mass Stabilization of Soft Soil Foundation Based on MgO-CO2 Carbonation Technology

Song-yu Liu, Guang-hua Cai, Guang-yin Du, Liang Wang, Jia-fu Chen, Chuan Qin et al.
Pages 743-752

Analytical Solution for Plane Strain Consolidation of Soft Soil Stabilised by Stone Columns

Sam Doan, Behzad Fatahi, Hadi Khabbaz, Haleh Rasekh
Pages 753-767

[Impact of Lime Stabilization on Swelling and Soil Water Retention Behavior of Expansive Subgrade]

Asmaa Al-Taie, Mahdi M. Disfani, Robert Evans, Arul Arulrajah, Ehsan Yaghoubi
Pages 769-780

[Evaluation of Strength and Microstructural Characteristics of Weak Lateritic Soil Stabilized with Calcined Clay and Iron Slag Dust]

H. A. Quadri, O. S. Abiola, S. O. Odunfa, J. O. Azeez
Pages 781-793

[A Case Study on the Efficacy of Cement Treated Base/subbase]

Ashish Gharpure, Prashant Navalakha, Asita Dalvi
Pages 795-805

[Comparative Evaluation of Lime and Biopolymer Amended Expansive Soil]

G. Landlin, B. Sharmila, S. Bhuvaneshwari
Pages 807-821

[Evaluation of Penetration Index of Untreated and Treated Soil Using Dynamic Cone Penetrometer]

V. S. N. Pavan Kumar Pratapa
Pages 823-835

[Fundamental Study on Combination of Paper Sludge Ash and Cement for Dredged Clay Soil Stabilization]

Nguyen Binh Phan, Kimitoshi Hayano, Yoshitoshi Mochizuki
Pages 837-849

[Shrinkage Curve of Treated Sulfate-Bearing Soils with GGBS]

Hussein Al-Dakheeli, Amir Javid, Mengting Chen, Rifat Bulut
Pages 851-859

[A Study on Electrokinetic Dewatering of Saturated Soil]

Abhishek A. Sutar, Veerabhadrappa M. Rotte
Pages 861-873

Evaluation of Mineral Formation in Sulfate Bearing Soil Stabilized with Slag Cement Using XRD

Mengting Chen, Hussein Al-Dakheeli, Jim Puckette, Rifat Bulut
Pages 875-883

CBR Characteristics of Kaolin-Simulated Clay Type Subgrade Stabilised with Cement, Lime, Poly-Fibre and Ionic Compounds mix

Chee-Ming Chan, Abdul Rashid Ahmad Nasri, Poi-Cheong Tan, Danny Ng
Pages 885-895

Influence of Moisture Content on Strength of Stabilised Drilling Slurry

Mingwei Feng, Juan Wang, Shu Liu, Yunfeng Hu
Pages 897-906

Compaction and CBR Behaviour of Cement-Stabilised Sand–Black Cotton Soil Mixtures

Charles M. O. Nwaiwu, Baba Benjamin, Obinna U. Ubani
Pages 907-920

Improving Mechanical Properties of Two Mexican Soils by Utilizing Calcium Oxide

Natalia Perez, Paul Garnica, Francisco Javier Castañeda, Mario Enrique Peña
Pages 921-932

Harbor Geotechnics

Front Matter PDF

Pages 933-933

[Particle Breakage Observed in Both Transitional and Non-transitional Carbonate Sands]

Chenxi Tong, Sheng Zhang, Daichao Sheng
Pages 935-943

[Investigation of Interaction of Piles at New Cargo Sea Transportation Route and LRT Projects with Problematic Soils of Kazakhstan]

Askar Zhussupbekov, Victor Kaliakin, Der-Wen Chang, Abdulla Omarov
Pages 945-957

[Analysis and Design of a Special Port Pavement for Heavy Steel Coils]

Nicolas Echeverri Pinto
Pages 959-971

[A Study on Suction Properties, Subgrade Modulus and Compressibility of Marine Soil Subgrade for Flexible Pavements]

Ram Wanare, Pritam Sinha, Kannan K. R. Iyer
Pages 973-986

← Previous Page 4 of 4 Next →

Back to top ↑

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This volume presents selected papers presented during the 4th International Conference on Transportation Geotechnics (ICTG). The papers address the geotechnical challenges in design, construction, maintenance, monitoring, and upgrading of roads, railways, airfields, and harbor facilities and other ground transportation infrastructure with the goal of providing safe, economic, environmental, reliable and sustainable infrastructures. This volume will be of interest to postgraduate students, academics, researchers, and consultants working in the field of civil and transport infrastructure.

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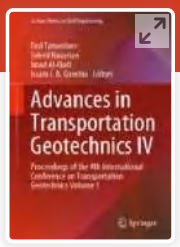

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Ram Wanare, Pritam Sinha & Kannan K. R. Iyer

Conference paper | First Online: 31 August 2021

988 Accesses

Part of the Lecture Notes in Civil Engineering book series (LNCE,volume 164)

Abstract

One of the important parameters that governs suitability of soil subgrade for flexible pavements is subgrade modulus and it depends on many factors such as type of loading and its magnitude, soil type and its engineering properties, flexural stiffness of the pavement structure and relative stiffness of the soil subgrade and pavement structure. The strength and stiffness of soil affects its relative stiffness with pavement structure and depends on various factors such as water content, soil type, degree of compaction and soil suction. For most soils, soil suction is mainly

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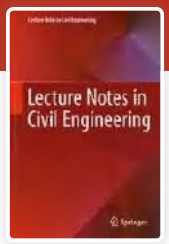

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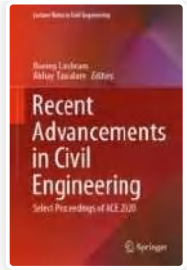

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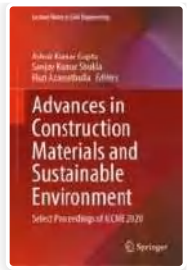

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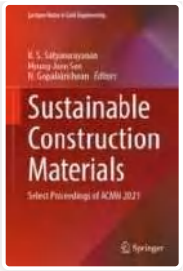

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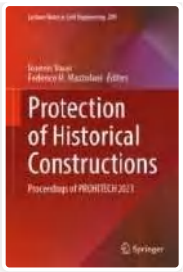

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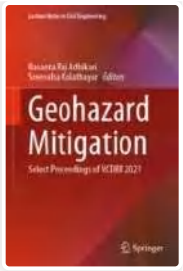

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Table of contents

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Table of contents (38 papers)

Search within book

← Previous Page 2 of 3 Next →

Landslide Hazard Assessment and Mitigation

Probabilistic Stability Analysis of Helical Soil Nailed Wall Using the Monte-Carlo Simulation

Ekansh Agarwal, Mahesh Sharma, Anindya Pain
Pages 221-232

Effect of Geogrid on Landslide Prevention of Soil Slope Under Static Loading

Shubham Gupta, Vishal Sharma, Raju Sarkar, Amit Kumar Srivastava
Pages 233-247

Recent Advances in Early Warning Systems for Landslide Forecasting

Ram Wanare, Kannan K. R. Iyer, Prathyusha Jayanthi
Pages 249-260

Numerical Modelling of Mechanically Stabilized Earth Walls for Slope Protection

P. R. Reshma, Sridhar Gangaputhiran
Pages 261-270

Earthquake-Induced Landslides in the Indian Himalayas and Glimpses of Code Provisions for Seismic Design of Slopes: A Review

A. Mugesh, Koushik Pandit
Pages 271-280

Landslide Susceptibility of Madanpura (Fatehpur Sikri, Agra in Vindhyan Hills, India) Using Arc GIS

Jibran Qadri, M. Masroor Alam, Md. Rehan Sadique
Pages 281-291

Numerical Investigation of Soil–Structure Interaction Behaviour of Landslide Prevention Piles

G. Sreelakshmi, M. N. Asha
Pages 293-304

Antecedent and Cumulative Rainfall as Thresholds in Detecting Possible Landslide Occurrence

N. H. N. Khalid, Fathoni Usman, R. C. Omar, S. Norhisham
Pages 305-313

Geotechnical Engineering

Front Matter PDF

Pages 315-315

Assessment of Site Amplification Using Borehole and Surface Data: Variability of Site Effect Estimation from Different Phases of the Accelerogram

Parveen Kumar, Sandeep, Monika
Pages 317-331

Effects of Complex Valley Topography on De-amplification Scenerio for SH-Waves

Neeraj Kumar, Vinay Kumar, J. P. Narayan, Vishvendra Tiwari, Sanjay Kumar
Pages 333-345

Assessment of Soil Gas Radon (Rn222) Emission in Kachchh, Gujarat, India: Influence of Meteorological Parameters and Identification of Precursors to Impending Earthquakes

Sushanta Kumar Sahoo, Katlamudi Madhusudan Rao
Pages 347-363

Ground Responses Due to the Effect of Tunnelling in Sandy Soil

Vishalatchi Ramasamy, S. Karthigeyan
Pages 365-379

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Bhagya Baburajan, Surya Muthukumar, Dhanya Sathyan
Pages 381-391

Numerical Analysis of Soil Nailed Vertical Wall Using PLAXIS

P. S. Sreedevi, Surya Muthukumar, Dhanya Sathyan
Pages 393-401

Dynamic Soil–Structure Interaction Effects in Integrated Retaining Wall-Building System

N. Sri Vinay, Amrita, B. R. Jayalekshmi, R. Shivashankar
Pages 403-413

Laboratory Model Study on Erosion Control Using Coir Geotextile

Surya Muthukumar, Sruthi Priyanka, Shanmuga Priya
Pages 415-430

Recent Innovations and Practices in Geotechnical Engineering for Sustainable Infrastructure Development

Parishi H. Dalal, Mahi Patil, Ram Wanare, Trudeep N. Dave, Kannan K. R. Iyer
Pages 431-445

Analysis of Cushion Effects in Unconnected Piled Raft Foundation

P. A. Amalu, B. R. Jayalekshmi
Pages 447-458

Development of Innovative Soil Nails Using Recycled Plastic and C&D Waste in Nilgiris District for Slope Upgradation Works Using Slide Program

Sooriya Narayanan Perumal, Meghna Raghoothaman Sreedevi
Pages 459-472

← Previous Page 2 of 3 Next →

Back to top ↑

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Back to top ↑

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Menu Search Cart

Geohazard Mitigation pp 249–260

Recent Advances in Early Warning Systems for Landslide Forecasting

Ram Wanare, Kannan K. R. Iyer & Prathyusha Jayanthi

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Abstract

Slope failures and landslides pose serious geotechnical challenges, as large fatalities and economic losses may occur due to such natural disasters. Landslides happen mainly due to excessive rainfall and large magnitude earthquake. In recent years, efforts have been made toward developing various early warning systems for landslide forecasting, which would help to minimize fatalities, by efficient evacuation, prior to the landslide event. The different methods/approaches for landslide forecasting include application of early warning sensors, acoustic emission-based slope alarm, displacement sensors, volumetric moisture content

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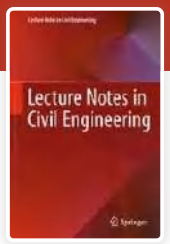

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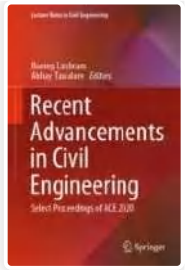

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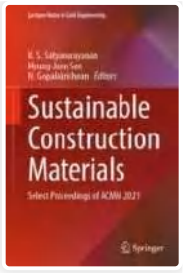

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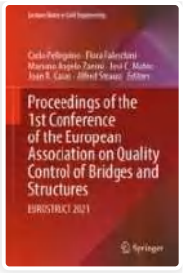

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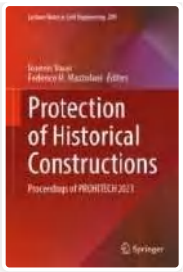

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Table of contents

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Table of contents (38 papers)

Search within book

← Previous Page 2 of 3 Next →

Landslide Hazard Assessment and Mitigation

Probabilistic Stability Analysis of Helical Soil Nailed Wall Using the Monte-Carlo Simulation

Ekansh Agarwal, Mahesh Sharma, Anindya Pain
Pages 221-232

Effect of Geogrid on Landslide Prevention of Soil Slope Under Static Loading

Shubham Gupta, Vishal Sharma, Raju Sarkar, Amit Kumar Srivastava
Pages 233-247

Recent Advances in Early Warning Systems for Landslide Forecasting

Ram Wanare, Kannan K. R. Iyer, Prathyusha Jayanthi
Pages 249-260

Numerical Modelling of Mechanically Stabilized Earth Walls for Slope Protection

P. R. Reshma, Sridhar Gangaputhiran
Pages 261-270

Earthquake-Induced Landslides in the Indian Himalayas and Glimpses of Code Provisions for Seismic Design of Slopes: A Review

A. Mugesh, Koushik Pandit
Pages 271-280

Landslide Susceptibility of Madanpura (Fatehpur Sikri, Agra in Vindhyan Hills, India) Using Arc GIS

Jibran Qadri, M. Masroor Alam, Md. Rehan Sadique
Pages 281-291

Numerical Investigation of Soil–Structure Interaction Behaviour of Landslide Prevention Piles

G. Sreelakshmi, M. N. Asha
Pages 293-304

Antecedent and Cumulative Rainfall as Thresholds in Detecting Possible Landslide Occurrence

N. H. N. Khalid, Fathoni Usman, R. C. Omar, S. Norhisham
Pages 305-313

Geotechnical Engineering

Front Matter PDF

Pages 315-315

Assessment of Site Amplification Using Borehole and Surface Data: Variability of Site Effect Estimation from Different Phases of the Accelerogram

Parveen Kumar, Sandeep, Monika
Pages 317-331

Effects of Complex Valley Topography on De-amplification Scenerio for SH-Waves

Neeraj Kumar, Vinay Kumar, J. P. Narayan, Vishvendra Tiwari, Sanjay Kumar
Pages 333-345

Assessment of Soil Gas Radon (Rn222) Emission in Kachchh, Gujarat, India: Influence of Meteorological Parameters and Identification of Precursors to Impending Earthquakes

Sushanta Kumar Sahoo, Katlamudi Madhusudan Rao
Pages 347-363

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Vishalatchi Ramasamy, S. Karthigeyan
Pages 365-379

Dynamic Analysis of Soil Reinforced with Polypropylene Geotextile Using PLAXIS

Bhagya Baburajan, Surya Muthukumar, Dhanya Sathyan
Pages 381-391

Numerical Analysis of Soil Nailed Vertical Wall Using PLAXIS

P. S. Sreedevi, Surya Muthukumar, Dhanya Sathyan
Pages 393-401

Dynamic Soil–Structure Interaction Effects in Integrated Retaining Wall-Building System

N. Sri Vinay, Amrita, B. R. Jayalekshmi, R. Shivashankar
Pages 403-413

Laboratory Model Study on Erosion Control Using Coir Geotextile

Surya Muthukumar, Sruthi Priyanka, Shanmuga Priya
Pages 415-430

Recent Innovations and Practices in Geotechnical Engineering for Sustainable Infrastructure Development

Parishi H. Dalal, Mahi Patil, Ram Wanare, Trudeep N. Dave, Kannan K. R. Iyer
Pages 431-445

Analysis of Cushion Effects in Unconnected Piled Raft Foundation

P. A. Amalu, B. R. Jayalekshmi
Pages 447-458

Development of Innovative Soil Nails Using Recycled Plastic and C&D Waste in Nilgiris District for Slope Upgradation Works Using Slide Program

Sooriya Narayanan Perumal, Meghna Raghoothaman Sreedevi
Pages 459-472

← Previous Page 2 of 3 Next →

Back to top ↑

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Back to top ↑

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Menu Search Cart

Geohazard Mitigation pp 431–445

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569 Accesses | **2** Citations

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The scarcity of natural materials such as good native soil, river sand, and aggregates has shifted the focus in recent years toward sustainable solutions in geotechnical engineering. Industrial ash such as fly ash, pond ash, and incinerated ash from other sources are being utilized either as a stabilizing additive or as a replacement of natural geomaterials for filling applications in embankment, bridge abutment, structural fill below foundations, and pavement sublayers. The stabilizing agents such as microsilica,

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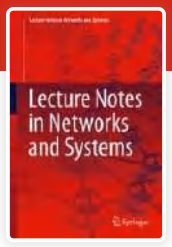

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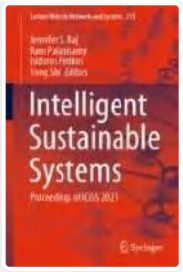

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Sections

Table of contents

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Table of contents (53 papers)

Search within book

Lifestyle Diseases Prevalent in Urban Slums of South India
Abhay Augustine Joseph, Hemlata Joshi, Matthew V. Vanlalchunga, Sohan Ray
Pages 356-365

Eccentric Graph of Join of Graphs
M. Rohith Raja, M. Tabitha Agnes, Sudev Naduvath
Pages 366-373

Differential Privacy in NoSQL Systems
Navraj Singh, Abhishek Shyam, Samatha R. Swamy, Prasad B. Honnavalli
Pages 374-384

Movie Success Prediction from Movie Trailer Engagement and Sentiment Analysis
Abin Emmanuvel, Vandana Bhagat, Lija Jacob
Pages 385-393

On the k-Forcing Number of Some DS-Graphs
M. R. Raksha, Charles Dominic
Pages 394-402

Document Classification for Recommender Systems Using Graph Convolutional Networks

Akhil M. Nair, Jossy George
Pages 403-410

A Study on the Influence of Geometric Transformations on Image Classification: A Case Study

Shashikumar D. Nellisara, Jyotirmoy Dutta, Sibu Cyriac
Pages 411-416

Asynchronous Method of Oracle: A Cost-Effective and Reliable Model for Cloud Migration Using Incremental Backups

Vaheedbasha Shaik, K. Natarajan
Pages 417-427

Analysis of Different Approach Used in Particle Swarm Optimization Variants: A Comparative Study

Amreen Khan, M. M. Raghuwanshi, Snehlata. S. Dongre
Pages 428-437

Identification of Offensive Content in Memes

Aayush Aman, Gopal Krishna, Tushar Anand, Anubhaw Lal
Pages 438-445

Prediction of Depression in Young Adults Using Supervised Learning Algorithm

Anushree Chakraborty, Samiksha Shukla
Pages 446-460

Analysis of Rule-Based Classifiers for IDS in IoT

Pushparaj Nimbalkar, Deepak Kshirsagar
Pages 461-467

Towards a Novel Strategic Scheme for Web Crawler Design Using Simulated Annealing and Semantic Techniques

S. Manaswini, Gerard Deepak

Pages 468-477

[Implementation Pathways of Smart Home by Exploiting Internet of Things (IoT) and Tensorflow]

Rahul Sarawale, Anupama Deshpande, Parul Arora
Pages 478-489

← Previous Page 3 of 3 Next →

Back to top ↑

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This book presents the best-selected papers presented at the International Conference on Data Science, Computation and Security (IDSCS-2021), organized by the Department of Data Science, CHRIST (Deemed to be University), Pune Lavasa Campus, India, during April 16–17, 2021. The proceeding is targeting the current research works in the areas of data science, data security, data analytics, artificial intelligence, machine learning, computer vision, algorithms design, computer networking, data mining, big data, text mining, knowledge representation, soft computing, and cloud computing.

Back to top ↑

Keywords

Data Science **Artificial Intelligence** **Machine Learning** **Quantum Computing** **Data and Network Security**

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Menu Search Cart

Data Science and Security pp 428–437

Analysis of Different Approach Used in Particle Swarm Optimization Variants: A Comparative Study

Amreen Khan, M. M. Raghuwanshi & Snehlata. S. Dongre

Conference paper | First Online: 27 August 2021

444 Accesses | **4** Citations

Part of the Lecture Notes in Networks and Systems book series (LNNS,volume 290)

Abstract

For every type of system transformation data/information plays a very important role. Everywhere artificial intelligence system is being deployed to reduce human efforts, as well as to improve system performance, accuracy, effectiveness and throughput of system. These artificial intelligent system works only on information feed to the system as an input. Swarm Intelligence is a most effective way of transmitting information between two communication parties. Most of the Artificial Intelligence system is based on Swarm Intelligence

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BOOK

SR. NO - 11

Physics (Marathi translation)

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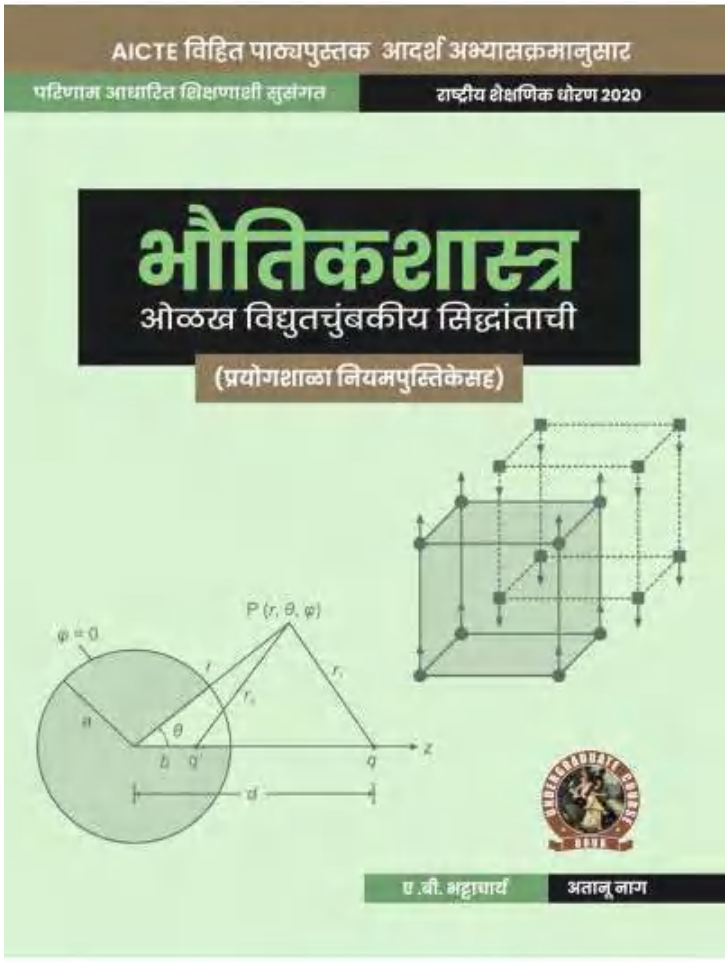

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by A. B. Bhattacharya, A. Nag

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- TABLE OF CONTENTS
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Foreword

Acknowledgement

Preface

Outcome Based Education

Course Outcomes

Abbreviations and Symbols

List of Figures

Guidelines for Teacher

Guidelines for Students

Unit 1: Electrostatics in Vacuum

Unit 2: Electrostatics in Linear Dielectric Medium

Unit 3: Magnetostatics

Unit 4: Magnetostatics in Linear Dielectric Medium

Unit 5: Faraday's Law

Unit 6: Maxwell's Equations

Unit 7: Electromagnetic Waves

Table of Physical Constants

Appendices

Annexures

References for Further learning

CO and PO attainment Table

Index

Engineering Physics: Introduction to Electromagnetic Theory has been written for the first year students of B. Tech Engineering Degree Courses of all Indian Universities following the guideline and syllabus as recommended by AICTE. The book, written in a very simple and lucid way, will be very much helpful to reinforce understanding of different aspects to meet the engineering student's needs Writing a text-cum manual of this category poses several challenges providing enough content without sacrificing the essentials, highlighting the key features, presenting in a novel format and building informative assessment. This book on engineering physics will prepare students to apply the knowledge of Electromagnetic Theory to tackle 21st century and onward engineering challenges and address the related questions.

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- **A. Nag**

Dr. Atanu Nag did his M. Sc. in 2007 and Ph. D. in 2013 from the University of Kalyani. He has published over 50 Journa papers and 5 books for Science & Engineering students. Presently he is the Head and Associate Professor in the Department of Physics, Modern Institute of Engineering & Technology, Hooghly, West Bengal.

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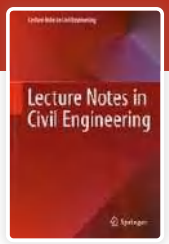

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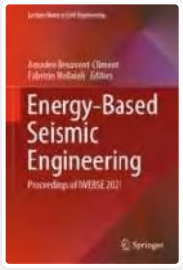

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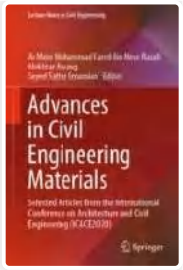

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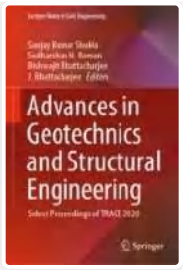

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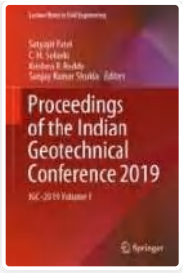

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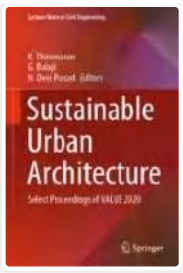

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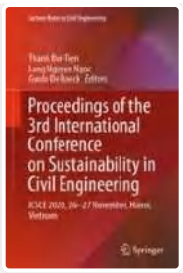

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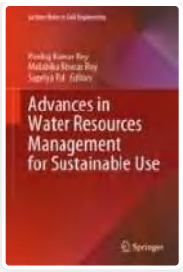

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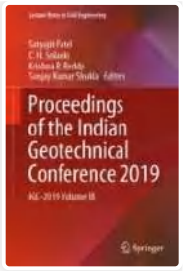

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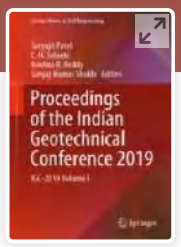

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Table of contents

About this book

Keywords

Editors and Affiliations

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Table of contents (66 papers)

Search within book

← Previous Page 2 of 4 Next →

Carrying Capacity of Model Steel Pile Foundation with Different Cross-Sectional Shapes in Sand

Khushal Paliwal, Nitin H. Joshi, Pooja Bhojani

Pages 225-236

An Experimental Study of the Piled Raft Foundation Subjected to Combined Vertical and Lateral Load

Uttam Kumar, Sandeep A. Vasanwala

Pages 237-248

Bell-Shaped Anchor with Geotextile Ties Embedded in Clay—A Numerical Study

Arya Das, Ashis Kumar Bera

Pages 249-261

[Studies on Tilt of Closely Spaced Strip Footings on Unreinforced and Reinforced Sands]

S. Anaswara, R. Shivashankar
Pages 263-272

[Experimental Evaluation of Failure Zone in Sand Beneath the Ring Footing and Cutting Edge of Open Caisson Using Image Analysis]

Jitesh T. Chavda, G. R. Dodagoudar
Pages 273-283

[Influence of Soil Variability in SPT Data for Predicting the Bearing Capacity of Piles]

Kotra Saikumar, Kaustav Chatterjee
Pages 285-295

[Nonlinear Analysis of Laterally Loaded Pile Group in Layered Soil–Ash Deposit]

Amit Kumar Ram, Supriya Mohanty
Pages 297-309

[Rationalization of LRFD Method for Safe Bearing Capacity of Shallow Footings to Incorporate the Type of Shear Failure]

Ronak Kotadia, K. N. Sheth, Avani Malaviya
Pages 311-322

[Case Study on Underpinning of Foundation for an Industrial Building Renovation]

A. Karthikeyan
Pages 323-333

[Evaluation of WSM, LRFD and FE Methods for Pile Capacity Calculation with Pile Load Test for IGM]

Pratik V. Shah, Kandarp K. Thaker
Pages 335-347

[Analysis and Design of Micro-pile Foundation for an Extension of a Commercial Building]

Rutuj Chheda, Atharva Pisolkar, Chhaya Kandpal, Jigisha Vashi, Aditya Soni, Rishabh Bakliwal
Pages 349-356

Experimental and Numerical Investigation of Combined Batter Pile–Raft Foundation Embedded in Sand

M. Mahalakshmi, B. Soundara, C. D. Hashini
Pages 357-363

An Analytical Parametric Study on Behaviour of Flexible Raft Foundation

Pritam Sinha, Ram Wanare, Parishi Dalal, Kannan K. R. Iyer
Pages 365-374

A Case on Engineered Solution for Deep Excavation in Restricted Space

Ajitkumar Kumbhar, Rajay Balwan, Girish Gokhale
Pages 375-382

Response of Laterally Loaded Monopile Using Three-Dimensional Finite Element Analysis

Jithin P. Zachariah, Jagdish Prasad Sahoo
Pages 383-394

Influence of Combined Vertical and Lateral Loading on Lateral Response of Piled Raft Foundation

Plaban Deb, Sujit Kumar Pal
Pages 395-406

Interpretation of Load-Settlement Curves from Graphical Methods

Naga Sireesha Ghanta, Sujit Kumar Pal
Pages 407-416

Behavior of Rigid Footing Rested on a Group of Stone Column

Mrinal Bhaumik, Suresh Prasad Singh, Megha Biswas
Pages 417-427

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Avik Kumar Mandal, S. Sailesh, Pradyot Biswas
Pages 429-449

[Evaluation of Bearing Capacity of Ground in Transition Zone]

Sreevar Ramesh, R. V. Suman, M. Yashwanth, S. K. Prasad
Pages 451-459

← Previous Page 2 of 4 Next →

Back to top ↑

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This book comprises select proceedings of the annual conference of the Indian Geotechnical Society. The conference brings together research and case histories on various aspects of geotechnical and geoenvironmental engineering. The book presents papers on geotechnical applications and case histories, covering topics such as (i) Characterization of Geomaterials and Physical Modelling; (ii) Foundations and Deep Excavations; (iii) Soil Stabilization and Ground Improvement; (iv) Geoenvironmental Engineering and Waste Material Utilization; (v) Soil Dynamics and Earthquake Geotechnical Engineering; (vi) Earth Retaining Structures, Dams and Embankments; (vii) Slope Stability and Landslides; (viii) Transportation Geotechnics; (ix) Geosynthetics Applications; (x) Computational, Analytical and Numerical Modelling; (xi) Rock Engineering, Tunnelling and Underground Constructions; (xii) Forensic Geotechnical Engineering and Case Studies; and (xiii) Others Topics: Behaviour of Unsaturated Soils, Offshore and Marine Geotechnics, Remote Sensing and GIS, Field Investigations, Instrumentation and Monitoring, Retrofitting of Geotechnical Structures, Reliability in Geotechnical Engineering, Geotechnical Education, Codes and Standards, and other relevant topics. The contents of

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An Analytical Parametric Study on Behaviour of Flexible Raft Foundation

Pritam Sinha, Ram Wanare, Parishi Dalal & Kannan K. R. Iyer

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Abstract

The understanding of soil–foundation–structure interaction is important for design of flexible raft foundation. For flexible foundation, the behaviour would be influenced by the loading as well as the foundation and soil parameters. The present study attempts to understand the influence of the parameters such as meshing size, loading intensity, magnitude of modulus of subgrade reaction (K_s) and raft thickness on base pressure and settlement of flexible raft foundation using STAAD Pro. A symmetrical multi-storeyed building with 25 columns along with

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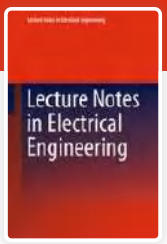

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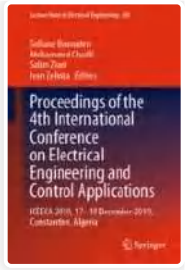

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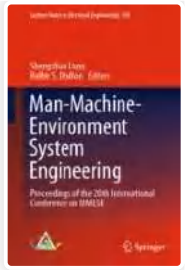

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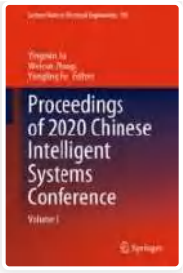

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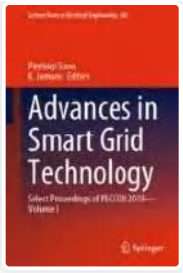

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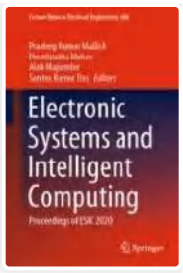

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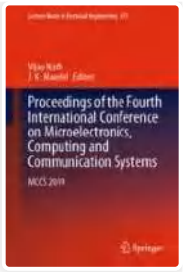

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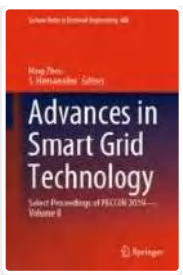

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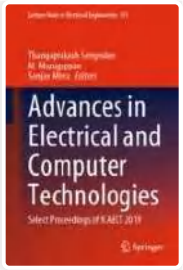

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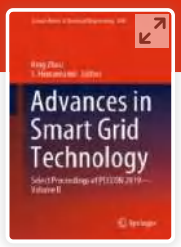

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Conference series link(s): PECCON: International Conference on Power Engineering Computing and Control

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Sections

Table of contents
About this book
Keywords
Editors and Affiliations
About the editors
Bibliographic Information
Publish with us

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Table of contents (41 papers)

Search within book

← Previous Page 2 of 3 Next →

Power Engineering

Optimal Placement of DG and Controlled Impedance FCL Sizing Using Salp Swarm Algorithm

C. Vasavi, T. Gowri Manohar
Pages 257-274

Delicate Flower Pollination Algorithm for Optimal Power Flow

S. Dhivya, R. Arul, K. Padmanathan
Pages 275-289

Optimization of Electric Field Distribution Along a 400-kV Composite Insulator

C. Archana, K. Usha
Pages 291-302

Vector Control Scheme for the PMSG-Based WPS Under Various Grid Disturbances

R. Vijaya Priya, R. Elavarasi

Pages 303-319

Phase Balancing of DG-Integrated Smart Secondary Distribution Network

Swapna Mansani, R. Y. Udaykumar, Santoshkumar, M. A. Asha Rani, S. Sreejith
Pages 321-333

Estimation of Payback Period Incorporating SVC and TCSC in SCUC Problem

S. Sreejith, M. A. Asha Rani, Swapna Mansani
Pages 335-352

Investigations on Salp Swarm Algorithm to Solve Combined Heat and Power Economic Dispatch

Arunachalam Sundaram, A. Peer Fathima, Morris Stella, F. Ruby Vincy Roy
Pages 353-361

A Review on Topological Aspects of Transformerless Dynamic Voltage Compensators

Mohanasundaram Ravi, R. Chendur Kumaran
Pages 363-375

A Novel Index Method for Distributed Generator Placement in a Radial Distribution System Using Pandapower Python Module

C. M. Thasnimol, R. Rajathy
Pages 377-390

Smart Eco Structures and Systems

Front Matter PDF

Pages 391-391

Haar FCM with DEMATEL Technique to Analyze the Solid Waste Management

A. Felix, Saroj Kumar Dash
Pages 393-402

[NARX-EMFO Based Controller Optimization for pH Neutralization in Wastewater Treatment]

Akshaykumar Naregalkar, D. Subbulekshmi
Pages 403-417

[Review of Particulate Matter Filters]

Nerella Venkata Sai Charan, S. Krithiga, Partha Sarathi Subudhi
Pages 419-432

Data Science and Data Analytics

Front Matter PDF

Pages 433-433

[Survey on Crime Analysis and Prediction Using Data Mining and Machine Learning Techniques]

P. Saravanan, J. Selvaprabu, L. Arun Raj, A. Abdul Azeez Khan, K. Javubar Sathick
Pages 435-448

[Crowd Management Using Ambient Intelligence]

V. Jacob Jebaraj, S. Surya, Velmathi Guruviah
Pages 449-456

[Analysis of Wind Speed Data in Tadipatri Region in Andhra Pradesh]

R. Reshma Gopi, A. Chitra, Pujari Harish Kumar, R. Mageshvaran
Pages 457-466

[A Literature Survey: Semantic Technology Approach in Machine Learning]

L. Rachana, S. Shridevi
Pages 467-477

[Deep Learning Approaches for Fall Detection Using Acoustic Information]

John Sahaya Rani Alex, M. Abai Kumar, D. V. Swathy
Pages 479-488

[Graphical Model and Model Search for Medical Data Analysis]

Naimish P. Mehta, R. Menaka, Arathy S. Prasad, Thanga Aarthy
Pages 489-499

← Previous Page 2 of 3 Next →

Back to top ↑

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This book comprises the select proceedings of the International Conference on Power Engineering Computing and Control (PECCON) 2019. This volume covers several important topics such as optimal data selection and error-free data acquiring via artificial intelligence and machine learning techniques, information and communication technologies for monitoring and control of smart grid components, and data security in smart grid network. In addition, it also focuses on economics of renewable electricity generation, policies for distributed generation, smart eco-structures and systems. This book can be useful for beginners, researchers as well as professionals interested in the area of smart grid technology.

Back to top ↑

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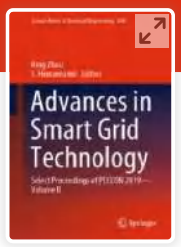

Advances in Smart Grid Technology pp 419–432

Review of Particulate Matter Filters

Nerella Venkata Sai Charan, S. Krithiga & Partha Sarathi Subudhi

Conference paper | First Online: 19 September 2020

454 Accesses | **1** Citations

Part of the Lecture Notes in Electrical Engineering book series (LNEE,volume 688)

Abstract

Increase in particulate matter (PM) in air causes a biggest threat in the twentieth century. In order to filtrate PM from air, filters are employed. These filters are called as particulate matter filter (PMF). These filters separate the PM from the polluted air. The processes followed by PMF to separate the PM from the polluted air are filtration and adsorption. Different filters are developed for this purpose. This chapter presents a critical review of different types of particulate filters. Porous- and fibrous-type filters are discussed in this chapter. This chapter explains the fabrication process of different PMF along with its advantages and

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Optimization of Thickness of Hollow Punch – Die for Proposed Solar Assisted Leaf Plate and Cup Making Machine

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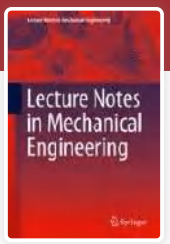

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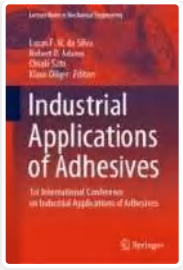

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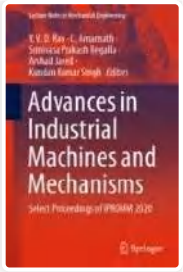

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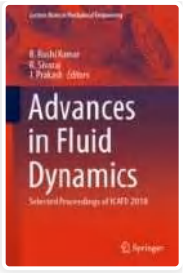

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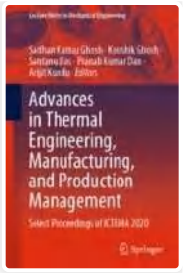

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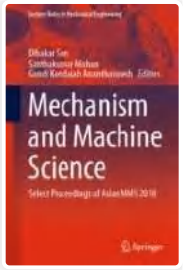

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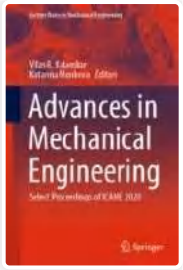

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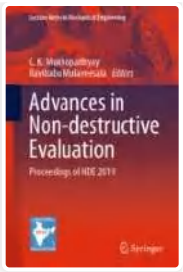

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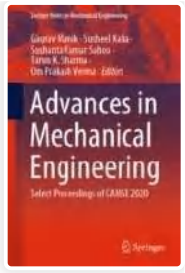

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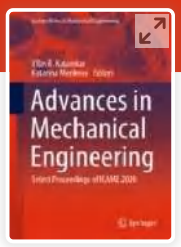

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Sections

Table of contents
About this book
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Table of contents (101 papers)

Search within book

← Previous Page 3 of 6 Next →

Design, Modelling and Optimization of Artificial Limb for Lower-Extremity Amputees Based on CATIA

Smit V. Motghare
Pages 345-351

An Experimental Study on Surface Roughness in Slicing Tungsten Carbide with Abrasive Water Jet Machining

Ranjan Singh, Virendra Singh, T. V. K. Gupta
Pages 353-359

Energy Absorption Characteristics of Single and Double-Walled Square Tubes Subjected to Axial Crushing

Sanjay S. Toshniwal, Raghu V. Prakash
Pages 361-369

Field Data Analysis Using Work Measurement Techniques in a Packaging Industry

Chinmay M. Salkar, Gaurao J. Tapare, Mayank A. Murkute, Chetan R. Zingre, Hansraj A. Mohod, Vinit S. Gupta
Pages 371-376

Comparative Study of Nanofinishing of Si (100) Using DDMAF and Allied Processes

Kheelraj Pandey, Ajendra Kumar Singh, Gaurav Raj Pandey
Pages 377-384

Optimization of Thickness of Hollow Punch–Die for Proposed Solar-Assisted Leaf Plate and Cup Making Machine

Abhay Nilawar, Pravin Potdukhe, Deepak V. Bhope
Pages 385-390

Development of Briquette Cum Pellet Making Machine

Yeshwant M. Sonkhaskar, Gajanan R. Nikhade, Saket Dharmik, Utkarsh Deshmukh, Pramod Dhote
Pages 391-397

Towards the Development of Low-Cost Vacuum Setup for Customized Implant Manufacturing

Sanjay Randiwe, Dheeraj Bhiogade, Abhaykumar M. Kuthe
Pages 399-406

Simulation Study on Effect of Variable Curvature on the Modal Properties of Curved Cantilever Beams

Aqleem Siddiqui, Girish Dalvi, Akshay Patil, Surabhi Chavan
Pages 407-414

Variation in the Properties of Spot Weldments of Cold Rolled Mild Steel Welded with Filler Metal by Annealing Treatment

Sushil T. Ambadkar, Deepak V. Bhope
Pages 415-424

Comparison of Metro Track Vibration with Federal Transit Administration Limits

Chaitanya V. Bhore, Atul B. Andhare, Pramod M. Padole

Pages 425-431

Effect of Moisture Content and Fiber Orientation on the Mechanical Behavior of GFRP Composites

Alok Behera, M. M. Thawre, Atul Ballal, Prathamesh Babrekar, Pratik Vaidya, Satya Vijetha et al.
Pages 433-439

Experimental Investigation and Simulation of Modified Evaporative Cooling System

Manju Lata, Dileep Kumar Gupta
Pages 441-448

Effects of Different Vegetable Oils and Additives in Gearbox Operation and its Condition Monitoring

Anupkumar Dube, M. D. Jaybhaye
Pages 449-456

Study and Analysis of Various Parameters of Bio-mechanization Plant

Deepak Patil, Rahul Barjibhe, Lakhan Meghani, Omkar Nanaware, Tejas More, Aditya Pujari
Pages 457-463

Robust Sliding Mode Controller (RSMC) for an Omniwheeled Mobile Robot with Uncertainties and External Perturbations

Mohammad Saad, Uddesh Tople, Amrapali Khandare, Zeeshan Ul Islam
Pages 465-472

The CFD Analysis of Convection Heat Transfer with Magnetic Field in the 2D Domain Using OpenFOAM

Ranjit J. Singh, Trushar B. Gohil
Pages 473-479

Design of a Remote Racking Module for Racking Operation

Alex Sherjy Syriac, M. R. Rahul

Pages 481-486

A Coupled Heat Transfer and Artificial Neural Network Based Model for Accelerated Direct Cooling of Steel Plate

Sagar Dave, Sirshendu Chattopadhyay, Deepak Gupta
Pages 487-493

Effect of Air Distribution on Cooling of Photovoltaic Panel and Its Performance

Someshwar S. Bhakre, Pravin D. Sawarkar
Pages 495-502

← Previous Page 3 of 6 Next →

Back to top ↑

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Back to top ↑

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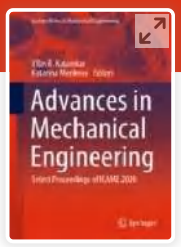

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Optimization of Thickness of Hollow Punch–Die for Proposed Solar-Assisted Leaf Plate and Cup Making Machine

Abhay Nilawar, Pravin Potdukhe & Deepak V. Bhope

Conference paper | First Online: 30 June 2020

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Abstract

Leaf plates are traditionally made by hand in Indian villages. These are commonly used for serving food at family, religious and social functions. The laborious craft can now be converted into machine operation to make these containers in elegant shape and sizes and to make the plates much stronger than the normal one by the conventional method of making plates. The punch–die assembly of the traditional machine consists of an electric heater where the effective heating temperature is maintained from 110 to 120 °C. Alternatively, this temperature can also be achieved

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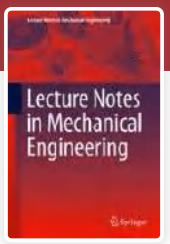

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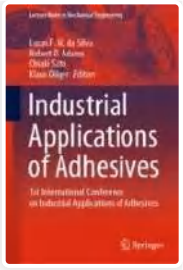

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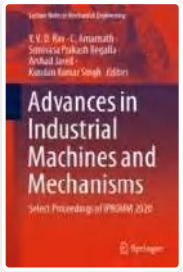

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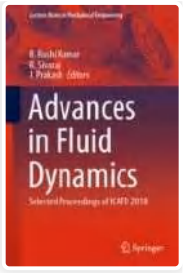

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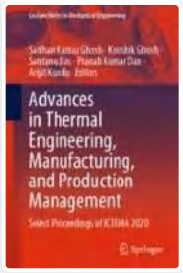

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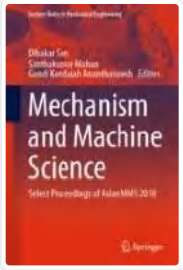

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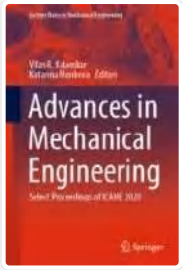

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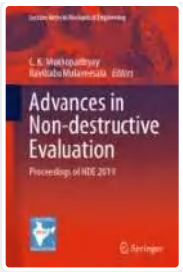

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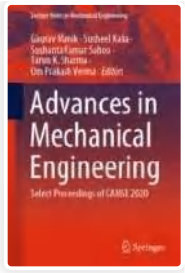

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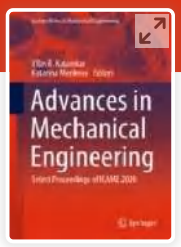

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← Previous Page 3 of 6 Next →

Design, Modelling and Optimization of Artificial Limb for Lower-Extremity Amputees Based on CATIA

Smit V. Motghare
Pages 345-351

An Experimental Study on Surface Roughness in Slicing Tungsten Carbide with Abrasive Water Jet Machining

Ranjan Singh, Virendra Singh, T. V. K. Gupta
Pages 353-359

Energy Absorption Characteristics of Single and Double-Walled Square Tubes Subjected to Axial Crushing

Sanjay S. Toshniwal, Raghu V. Prakash
Pages 361-369

Field Data Analysis Using Work Measurement Techniques in a Packaging Industry

Chinmay M. Salkar, Gaurao J. Tapare, Mayank A. Murkute, Chetan R. Zingre, Hansraj A. Mohod, Vinit S. Gupta
Pages 371-376

Comparative Study of Nanofinishing of Si (100) Using DDMAF and Allied Processes

Kheelraj Pandey, Ajendra Kumar Singh, Gaurav Raj Pandey
Pages 377-384

Optimization of Thickness of Hollow Punch–Die for Proposed Solar-Assisted Leaf Plate and Cup Making Machine

Abhay Nilawar, Pravin Potdukhe, Deepak V. Bhope
Pages 385-390

Development of Briquette Cum Pellet Making Machine

Yeshwant M. Sonkhaskar, Gajanan R. Nikhade, Saket Dharmik, Utkarsh Deshmukh, Pramod Dhote
Pages 391-397

Towards the Development of Low-Cost Vacuum Setup for Customized Implant Manufacturing

Sanjay Randiwe, Dheeraj Bhiogade, Abhaykumar M. Kuthe
Pages 399-406

Simulation Study on Effect of Variable Curvature on the Modal Properties of Curved Cantilever Beams

Aqleem Siddiqui, Girish Dalvi, Akshay Patil, Surabhi Chavan
Pages 407-414

Variation in the Properties of Spot Weldments of Cold Rolled Mild Steel Welded with Filler Metal by Annealing Treatment

Sushil T. Ambadkar, Deepak V. Bhope
Pages 415-424

Comparison of Metro Track Vibration with Federal Transit Administration Limits

Chaitanya V. Bhore, Atul B. Andhare, Pramod M. Padole

Pages 425-431

Effect of Moisture Content and Fiber Orientation on the Mechanical Behavior of GFRP Composites

Alok Behera, M. M. Thawre, Atul Ballal, Prathamesh Babrekar, Pratik Vaidya, Satya Vijetha et al.
Pages 433-439

Experimental Investigation and Simulation of Modified Evaporative Cooling System

Manju Lata, Dileep Kumar Gupta
Pages 441-448

Effects of Different Vegetable Oils and Additives in Gearbox Operation and its Condition Monitoring

Anupkumar Dube, M. D. Jaybhaye
Pages 449-456

Study and Analysis of Various Parameters of Bio-mechanization Plant

Deepak Patil, Rahul Barjibhe, Lakhan Meghani, Omkar Nanaware, Tejas More, Aditya Pujari
Pages 457-463

Robust Sliding Mode Controller (RSMC) for an Omniwheeled Mobile Robot with Uncertainties and External Perturbations

Mohammad Saad, Uddesh Tople, Amrapali Khandare, Zeeshan Ul Islam
Pages 465-472

The CFD Analysis of Convection Heat Transfer with Magnetic Field in the 2D Domain Using OpenFOAM

Ranjit J. Singh, Trushar B. Gohil
Pages 473-479

Design of a Remote Racking Module for Racking Operation

Alex Sherjy Syriac, M. R. Rahul

Pages 481-486

A Coupled Heat Transfer and Artificial Neural Network Based Model for Accelerated Direct Cooling of Steel Plate

Sagar Dave, Sirshendu Chattopadhyay, Deepak Gupta
Pages 487-493

Effect of Air Distribution on Cooling of Photovoltaic Panel and Its Performance

Someshwar S. Bhakre, Pravin D. Sawarkar
Pages 495-502

← Previous Page 3 of 6 Next →

Back to top ↑

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Back to top ↑

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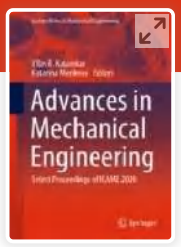

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Sushil T. Ambadkar & Deepak V. Bhope

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Abstract

Filler metal addition has been verified as an effective way to refine the mechanical behaviour of cold rolled mild steel in resistance spot welding. Negligible quantity of filler metal if added to the spot weld is found to improve mechanical properties of spot weldments, if no variation in the composition of base metal and filler metal is allowed. Looking at practical applications, the sensitivity of the resistance spot welding process with filler metal to variation in annealing treatment was experimentally investigated.

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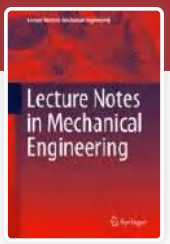

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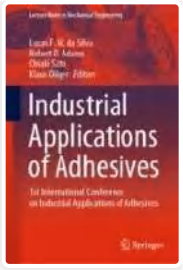

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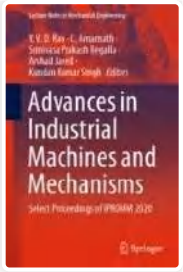

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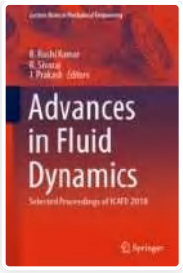

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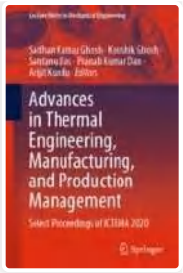

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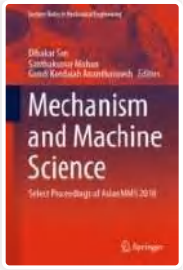

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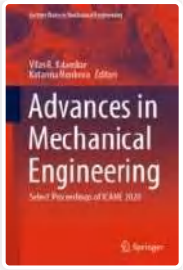

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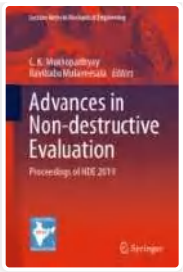

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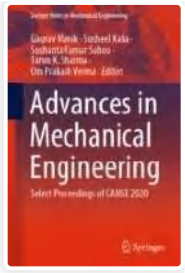

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← Previous 1 ... 29 30 31 32 33 ... 49 Next →

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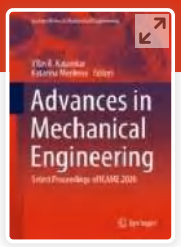

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Sections

Table of contents
About this book
Keywords
Editors and Affiliations
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Table of contents (101 papers)

Search within book

← Previous Page 2 of 6 Next →

Experimental Comparison Between Friction Stir Welding and Underwater Friction Stir Welding on Al6061 Alloys
Hiten J. Mistry, Piyush S. Jain, J. Vaghela Tinej
Pages 169-177

Wear Particle Analysis Using Fractal Techniques
Puja P. More, M. D. Jaybhaye
Pages 179-188

Strategies for Low Engine Speed Torque Enhancement of Natural Gas Engine Used for Commercial Vehicles: Observations with Compression Ratio
Pritesh J. Suple, Chandrakant R. Sonawane, S. S. Thipse, J. P. Mohite, N. B. Chougule
Pages 189-195

In-house Fabrication and Calibration of Silver Thin Film Gauge

Akash Jadhav, Ravi K. Peetala
Pages 197-204

Study of Shock Wave Boundary Layer Interaction in Hypersonic Flows Using Various Turbulence Models

Aniruddha Kane, Ravi K. Peetala
Pages 205-211

Study of Effect on Engine Performance Using 15% HCNG Blend Versus CNG Using a Simulation Approach

K. P. Kavathekar, S. S. Thipse, S. D. Rairikar, S. B. Sonawane, P. S. Sutar, D. Bandyopadhyay
Pages 213-219

Behaviour of NiTi Based Smart Actuator for the Development of Planar Parallel Micro-Motion Stage

Deep Singh, Yogesh Singh, Manidipto Mukherjee
Pages 221-228

Multi-objective Optimization of Inconel 718 Using Combined Approach of Taguchi—Grey Relational Analysis

Manav Sheth, Kunj Gajjar, Aryan Jain, Vrund Shah, Het Patel, Rakesh Chaudhari et al.
Pages 229-235

The Effect of State Variables on Nucleation of Earthquake Using the Rate and State Friction

Nitish Sinha, Arun K. Singh, Avinash D. Vasudeo
Pages 237-242

Finite Element Analysis of Type I and Type II Fracture with PFN Implant—A Comparative Study

Sandeep Rathor, Jayamalya Jena, Rashmi Uddanwadikar, Ashutosh Apte
Pages 243-251

Postural Evaluation of Construction Labourers Engaged in Excavation Work Using Newly Developed NERPA Method and Its Validation Through REBA and WERA Methods

Manoj T. Gajbhiye, Debamalya Banerjee, Saurav Nandi
Pages 253-261

Influence of Stress Bar Length on the Response of a Stress Wave Force Balance Using Finite Element Analysis

Sushmita Deka, Ramesh Babu Pallekonda, Maneswar Rahang
Pages 263-270

Relative Power Variation in Frequency Sub-bands of the EEG Signal During Painful Stimuli

Sameer Raj Singh, Ashish B. Deoghare
Pages 271-277

A Study on the Effect of GTAW Input Current on Surface Distortion of Thin CRNO Electrical Steel Sheets

Bhushan Y. Dharmik, Nitin K. Lautre
Pages 279-287

Heat Transfer and Pressure Drop Inside Duct with Different Surface Profiles

P. P. Shirpurkar, V. M. Sonde, P. T. Date, T. R. Badule
Pages 289-297

A Hybrid Process Monitoring Strategy for Steel Making Shop

Ashish Kumar, Anupam Das, Swarnambuj Suman
Pages 299-305

Analysis of Electrolyte Flow in IEG During Electrochemical Grinding of MMC

Nisha Gupta, Avanish Kumar Dubey, Dhruv Kant Rahi
Pages 307-315

[Static Structural Analysis of Roll Cage of an All-Terrain Vehicle]

Sushant Satputaley, Karan Ksheersagar, Bijay Sankhari, Rahul Kavishwar, Kshitij Waghdhare
Pages 317-327

[Design of Motorcycle Handlebar for Reduction of Vibrations Using Tuned Mass Damper]

Sumit S. Khune, Amit R. Bhende
Pages 329-335

[Development of a Diagnostive Tool for Prediction of Severity of Coronary Artery Disease]

Pooja Jhunjhunwala, Pramod M. Padole, S. B. Thombre
Pages 337-343

← Previous Page 2 of 6 Next →

Back to top ↑

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Back to top ↑

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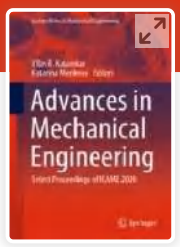

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A Study on the Effect of GTAW Input Current on Surface Distortion of Thin CRNO Electrical Steel Sheets

Bhushan Y. Dharmik & Nitin K. Lautre

Conference paper | First Online: 30 June 2020

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Part of the Lecture Notes in Mechanical Engineering book series (LNME)

Abstract

The thin sheets of CRNO electrical steel are widely used in motors of electric vehicles (EV) and several domestic appliances. The thin sheets of thickness 0.5 mm are stacked and welded across the edges to form the stator core for use in the electric motors. The present work aims to study the distortion variations observed on the CRNO thin sheets under different range of welding current (30–110 A). The stacks comprising of thin sheets of CRNO with total thickness of 50 mm (100 sheets × 0.5 mm) post-welding are observed for evaluating the distortion on the surface of stacks. The

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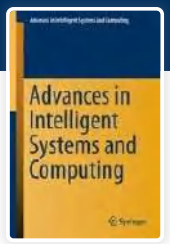

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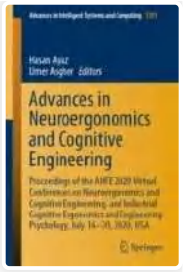

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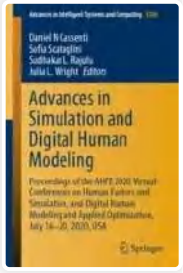

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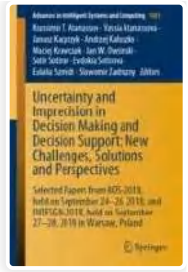

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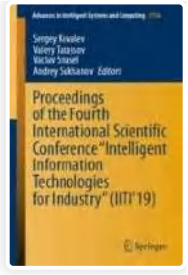

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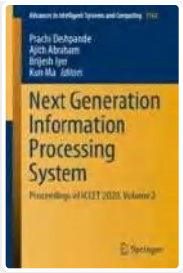

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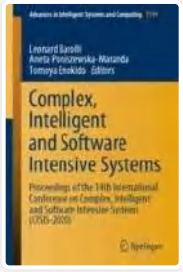

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Table of contents

About this book

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Table of contents (46 papers)

Search within book

← Previous Page 2 of 3 Next →

Advanced Security Techniques

Identification of Windows-Based Malware by Dynamic Analysis Using Machine Learning Algorithm

Areeba Irshad, Malay Kishore Dutta
Pages 207-218

Secure E-mail Communications Through Cryptographic Techniques—A Study

Shafiya Afzal Sheikh, M. Tariq Banday
Pages 219-235

Current Trends in Cryptography, Steganography, and Metamorphic Cryptography: A Survey

Ranjana Joshi, Munesh C. Trivedi, Avadhesh Kumar Gupta, Paritosh Tripathi
Pages 237-247

Web and Informatics

Front Matter PDF

Pages 249-249

Enhancement in Algorithmic Design for Scalability Measurement of Web Application

Pankaj N. Moharil, Sudarson Jena, V. M. Thakare
Pages 251-263

A Survey on Internet of Things (IoT): Layer-Specific, Domain-Specific and Industry-Defined Architectures

Harmanjot Kaur, Rohit Kumar
Pages 265-275

A Survey on Social Networking Using Concept of Evolutionary Algorithms and Big Data Analysis

Rutuja Nawghare, Sarsij Tripathi, Manu Vardhan
Pages 277-292

A Comparative Study of Deployment Tools from IoT Perspective

Raghav Maheshwari, K. Rajalakshmi
Pages 293-306

A Perspective of Missing Value Imputation Approaches

Wajeeha Rashid, Manoj Kumar Gupta
Pages 307-315

Advanced Deadline-Sensitive Scheduling Approaches in Cloud Computing

Duraksha Ali, Manoj Kumar Gupta
Pages 317-329

A Survey of Text Mining Approaches, Techniques, and Tools on Discharge Summaries

Priyanka C. Nair, Deepa Gupta, Bhagavatula Indira Devi
Pages 331-348

Smart Environmental Monitoring Based on IoT: Architecture, Issues, and Challenges

Meenakshi Srivastava, Rakesh Kumar
Pages 349-358

Wideband Band-stop Filter for C-Band and S-Band Applications Using Finite Integration in Time-Domain Technique

Ajay Gupta, Anil Rajput, Monika Chauhan, Biswajeet Mukherjee
Pages 359-366

A Two-Step Technique for Effective Scheduling in Cloud–Fog Computing Paradigm

Ashish Mohan Yadav, S. C. Sharma, Kuldeep N. Tripathi
Pages 367-379

Design of a Drag and Touch Multilingual Universal CAPTCHA Challenge

Abdul Rouf Shah, M. Tariq Banday, Shafiya Afzal Sheikh
Pages 381-393

Using Gaussian Mixtures on Triphone Acoustic Modelling-Based Punjabi Continuous Speech Recognition

Wiqas Ghai, Suresh Kumar, Vijay Anant Athavale
Pages 395-406

Domain of Competency of Classifiers on Overlapping Complexity of Datasets Using Multi-label Classification with Meta-Learning

Shivani Gupta, Atul Gupta
Pages 407-418

Intelligent Hardware

Front Matter PDF

Pages 419-419

Comparative Analysis of FOPID and Classical Controller Performance for an Industrial MIMO Process

Sheetal Kapoor, Mayank Chaturvedi, Pradeep Kumar Juneja
Pages 421-431

Reduced-Order Modeling of Transient Power Grid Network with Improved Basis POD

Satyavir Singh, Mohammad Abid Bazaz, Shahkar Ahmad Nahvi
Pages 433-444

← Previous Page 2 of 3 Next →

Back to top ↑

About this book

This book features high-quality papers presented at the International Conference on Computational Intelligence and Communication Technology (CICT 2019) organized by ABES Engineering College, Ghaziabad, India, and held from February 22 to 23, 2019. It includes the latest advances and research findings in fields of computational science and communication such as communication & networking, web & informatics, hardware and software designs, distributed & parallel processing, advanced software engineering, advanced database management systems and bioinformatics. As such, it is of interest to research scholars, students, and engineers around the globe.

Back to top ↑

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Log in

Menu Search Cart

Advances in Computational Intelligence and Communication Technology pp 433–444

Reduced-Order Modeling of Transient Power Grid Network with Improved Basis POD

Satyavir Singh, Mohammad Abid Bazaz & Shahkar Ahmad Nahvi

Conference paper | First Online: 19 June 2020

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Abstract

Power systems dynamics is represented by coupled equations and influenced by several elements. Most of these elements exhibit nonlinear behavior, and hence, computational efforts required for solving these coupled nonlinear equations are expensive. To simplify computational efforts, reduced-order model can be used. This reduced-order model is formulated by projecting a large-dimensional state vector onto a small-dimensional subspace spanned by an

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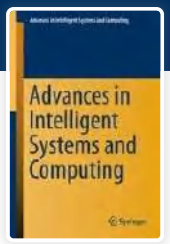

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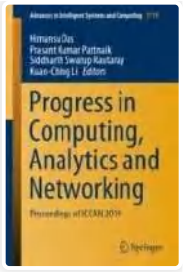

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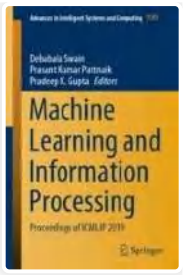

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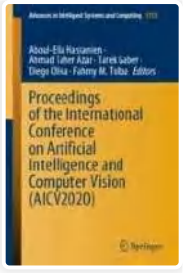

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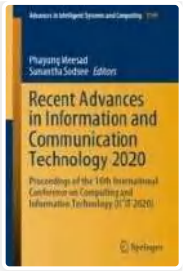

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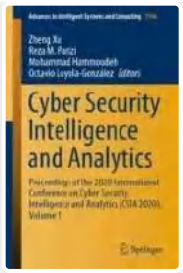

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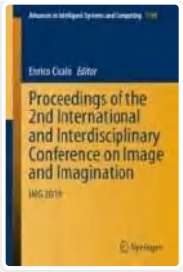

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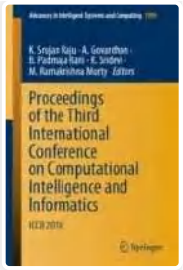

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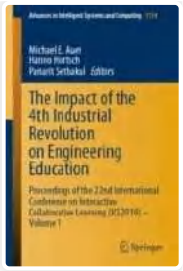

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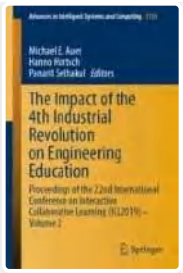

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← Previous 1 ... 32 33 34 35 36 ... 129 Next →

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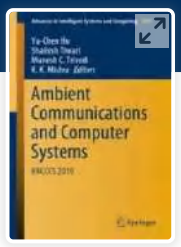

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Sections

Table of contents

About this book
Keywords
Editors and Affiliations
About the editors
Bibliographic Information
Publish with us

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Table of contents (35 papers)

Search within book

← Previous Page 1 of 3 Next →

Front Matter PDF
Pages i-xiv

Advanced Communications

Front Matter PDF
Pages 1-1

Topology-Aware Low-Cost Video Streaming for Video Data Over Heterogeneous Network
Garv Modwel, Anu Mehra, Nitin Rakesh, K. K. Mishra
Pages 3-13

Comparative Analysis of Graph Clustering Algorithms for Detecting Communities in Social Networks
Menta Sai Vineeth, Krishnappa RamKarthik, M. Shiva Phaneendra Reddy, Namala Surya, L. R. Deepthi
Pages 15-24

Energy-Efficient Heterogeneous WCEP for Enhancing Coverage Lifetime in WSNs

Amandeep Kaur Sohal, Ajay K. Sharma, Neetu Sood
Pages 25-36

Middleware Frameworks for Mobile Cloud Computing, Internet of Things and Cloud of Things: A Review

Tribid Debbarma, K. Chandrasekaran
Pages 37-50

Blockchain Security Threats, Attacks and Countermeasures

Shams Tabrez Siddiqui, Riaz Ahmad, Mohammed Shuaib, Shadab Alam
Pages 51-62

Intelligent Computing Techniques

Front Matter PDF

Pages 63-63

Implementation of Handoff System to Improve the Performance of a Network by Using Type-2 Fuzzy Inference System

Ritu, Hardeep Singh Saini, Dinesh Arora, Rajesh Kumar
Pages 65-76

Test Suite Optimization Using Lion Search Algorithm

Manish Asthana, Kapil Dev Gupta, Arvind Kumar
Pages 77-90

Advanced Twitter Sentiment Analysis Using Supervised Techniques and Minimalistic Features

Sai Srihitha Yadlapalli, R. Rakesh Reddy, T. Sasikala
Pages 91-104

Multi-objective Faculty Course Timeslot Assignment Problem with Result- and

Feedback-Based Preferences

Sunil B. Bhoi, Jayesh M. Dhodiya
Pages 105-119

Simulation of Learning Logical Functions Using Single-Layer Perceptron

Mohd Vasim Ahamad, Rashid Ali, Falak Naz, Sabih Fatima
Pages 121-133

Applicability of Financial System Using Deep Learning Techniques

Neeraj Kumar, Ritu Chauhan, Gaurav Dubey
Pages 135-146

Intelligent Hardware and Software Design

Front Matter PDF

Pages 147-147

Novel Reversible ALU Architecture Using DSG Gate

Shaveta Thakral, Dipali Bansal
Pages 149-156

An Appraisal on Microstrip Array Antenna for Various Wireless Communications and Their Applications

Gurudev Zalki, Mohammed Bakhar, Ayesha Salma, Umme Hani
Pages 157-169

Workload Aware Dynamic Scheduling Algorithm for Multi-core Systems

Savita Gautam, Abdus Samad
Pages 171-180

Almost Self-centered Index of Some Graphs

Priyanka Singh, Pratima Panigrahi
Pages 181-192

Computationally Efficient Scheme for Simulation of Ring Oscillator Model

Satyavir Singh, Mohammad Abid Bazaz, Shahkar Ahmad Nahvi

Pages 193-202

← Previous Page 1 of 3 Next →

Back to top ↑

About this book

This book features high-quality, peer-reviewed papers from the International Conference on Recent Advancement in Computer, Communication and Computational Sciences (RACCCS 2019), held at Aryabhatta College of Engineering & Research Center, Ajmer, India, on August 16–17, 2019. Presenting the latest developments and technical solutions in computational sciences, it covers a variety of topics, such as intelligent hardware and software design, advanced communications, intelligent computing technologies, advanced software engineering, the web and informatics, and intelligent image processing. As such it helps those in the computer industry and academia to use the advances in next-generation communication and computational technology to shape real-world applications.

Back to top ↑

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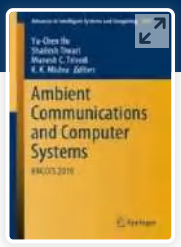
Menu Search Cart



Ambient Communications and Computer Systems pp 193–202

Computationally Efficient Scheme for Simulation of Ring Oscillator Model

Satyavir Singh, Mohammad Abid Bazaz & Shahkar Ahmad Nahvi

Conference paper | First Online: 14 March 2020

492 Accesses

Part of the Advances in Intelligent Systems and Computing book series (AISC,volume 1097)

Abstract

This work addresses the computational difficulties involved with the simulation of the nonlinear ring oscillator system in the offline and online phase. Conventional POD has offline basis extraction burden along with online computation in nonlinear systems. The computation of the nonlinear term can be improved with a discrete empirical interpolation method (DEIM). However, the issue of offline computation in POD still persists. This work proposed approximate snapshot ensemble generation for basis extraction in nonlinear model order reduction to

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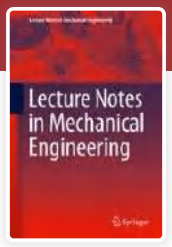

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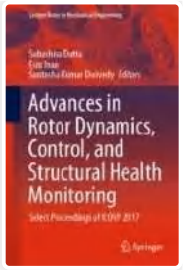

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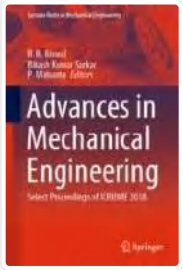

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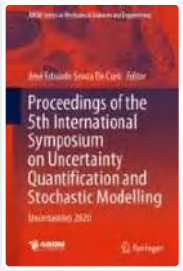

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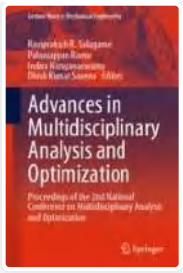

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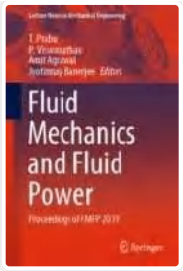

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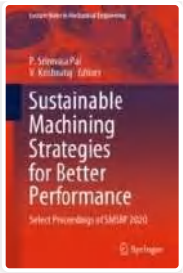

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← Previous 1 ... 28 29 30 31 32 ... 49 Next →

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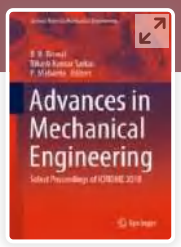

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Sections

Table of contents

About this book

Keywords

Editors and Affiliations

About the editors

Bibliographic Information

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Table of contents (144 papers)

Vibration and Acoustics

Multi-directional Sound Reduction by Slitted Sonic Crystal

Preeti Gulia, Arpan Gupta
Pages 1099-1108

A Novel Passive Mechanism to Improve Induced Strain in Two-DOF Piezoelectric Energy Harvester

Kote Suresh, K. Shankar, C. Sujatha
Pages 1109-1116

Cepstrum Analysis of Instantaneous Angular Speed for Gearbox Fault Detection

Sankar K. Roy, A. R. Mohanty, C. S. Kumar
Pages 1117-1125

Combustion Detection in IC Engine by Analysis of Instantaneous Angular Acceleration

Sankar K. Roy, A. R. Mohanty
Pages 1127-1137

Identification of Nonlinear Structural Parameters Using Combined Power Flow and Acceleration Matching Approaches

R. Anish, K. Shankar
Pages 1139-1149

Finite Element Analysis of Buckling, Free Vibration and Flexure of Clamped Laminated Composite Plates in Variable Thermal Environment

Ranjan K. Behera, Nitin Sharma, S. K. Parida
Pages 1151-1161

Detection of Local Defect Resonance Frequencies for Defect Imaging: A Nonlinear Ultrasound-Based Approach

Subhankar Roy, Tanmoy Bose, Kishore Debnath
Pages 1163-1172

Numerical Assessment of Fatigue Life for Concrete Column

Moinul Haq, Tabassum Naqvi, Suresh Bhalla
Pages 1173-1182

Non-linear Analysis of Rotational Inertial Double-Tuned Mass Damper by Harmonic Balance Method

S. Mohanty, S. Sikder, S. K. Dwivedy
Pages 1183-1190

Comparative Study of Performance of Optimized Valve for Different Flow Indices of Rheological Model

Keshav Manjeet, C. Sujatha
Pages 1191-1202

Static Stability Investigation of an Asymmetric Sandwich Beam in Temperature Environment

Dipesh Kumar Nayak, Pusparaj Dash
Pages 1203-1214

Renewable Energy

Front Matter PDF

Pages 1215-1215

Thermo-economic Study of Phase Change Materials (PCMs) for Thermal Energy Storage

Laxman Mishra, Abhijit Sinha, Rajat Gupta
Pages 1217-1226

Comparative Analysis of Absorber Tubes of Parabolic Trough Solar Collector Using Therminol VP-1 as Heat Transfer Fluid

Suresh Vishwakarma, Biplab Kumar Debnath, Kishore Debnath, Biplab Das
Pages 1227-1240

Exergy Analysis of a Variable Compression Ratio Engine Operated on Diesel and Pine Seed Oil Biodiesel Blends

Shivendra P. Singh, Biplab Kumar Debnath
Pages 1241-1251

Solar Resource Assessment Using GHI Measurements at a Site in Northeast India

A. Maisanam, B. Podder, K. K. Sharma, Agnimitra Biswas
Pages 1253-1265

Computational Analysis of Internally Grooved Absorber Tubes of Parabolic Trough Solar Collector for Constant Mass Flow Rate of the Heat Transfer Fluid

Suresh Vishwakarma, Prabina Kumar Meher, Biplab Kumar Debnath, Kishore Debnath
Pages 1267-1279

Effect of Size and Cascading of Receivers on the Performance of a Solar Collector System

Suraj Bhardwaj, Santosh Bopche
Pages 1281-1290

Experimental Investigation of Solar Powered Vapor Compression Air Conditioner with Indian Climatic Condition

Susant Kumar Sahu, N. Sendhil Kumar, T. Ganapathy
Pages 1291-1302

Feasibility of Wind Energy as Power Generation Source at Shillong (Meghalaya)

Syed Mujibur Rahman, Himadri Chattopadhyay, Romesh Laishram
Pages 1303-1313

← Previous Page 6 of 8 Next →

Back to top ↑

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This book comprises select proceedings of the International Conference on Recent Innovations and Developments in Mechanical Engineering (IC-RIDME 2018). The book contains peer reviewed articles covering thematic areas such as fluid mechanics, renewable energy, materials and manufacturing, thermal engineering, vibration and acoustics, experimental aerodynamics, turbo machinery, and robotics and mechatronics. Algorithms and methodologies of real-time problems are described in this book. The contents of this book will be useful for both academics and industry professionals.

Back to top ↑

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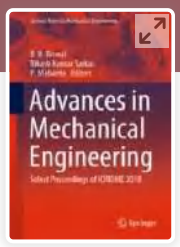

Advances in Mechanical Engineering pp 1281–1290

Effect of Size and Cascading of Receivers on the Performance of a Solar Collector System

Suraj Bhardwaj & Santosh Bopche

Conference paper | First Online: 17 January 2020

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Abstract

The effect of cascading of parabolic dish collector and receiver on the receiver collection efficiency has been presented in the present paper. The parabolic dish collector is modified in such a way that it focuses incident radiation at two focus points, in line with the vertex of the parabolic dish. The receivers are positioned at these two focii locations to absorb the concentrated heat. The outcomes in terms of receiver collection efficiency are compared with the single collector-receiver system. The gradual heating of working fluid while flowing through the combined

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Removal of hexavalent chromium from aqueous solution by alumina supported copper aluminum oxide nanoparticles

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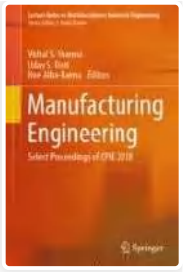

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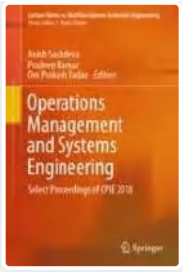

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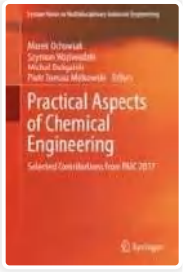

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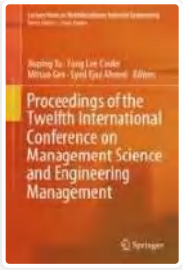

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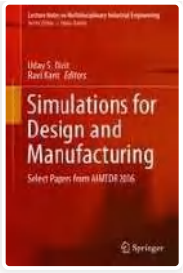

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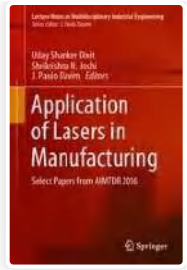

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Sections

Table of contents

About this book

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Table of contents (76 papers)

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← Previous Page 2 of 4 Next →

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Harshal Warade, Ramesh Daryapurkar, P. B. Nagarnaik
Pages 165-174

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Nitin Mishra, Sanjeev Kumar, Bhaskar R. Nikam
Pages 175-184

Change Detection of Land Use/Land Cover of Sardar Sorovar Command Area, India, Using Arc-Gis Tools

Shahid Shuja Shafai, Nitin Mishra, Sanjeev Kumar, Murari Kumar
Pages 185-193

Environmental Impact of Fly Ash Brick in Comparison with Traditional Brick

Amit Kumar Sharma, Sanjeev Kumar, Nitin Mishra
Pages 195-201

Land Cover/Land Use Change and Fragmentation in Uttarakhand, the Western Himalaya Based on GlobeLand30 Datasets

A. Arun Kumar, Tanvi Gaur, Sujata Upgupta, K. Ramesh, Sanjeev Kumar
Pages 203-215

Marine Debris in India: Quantifying Type and Abundance of Beach Litter Along Chennai, East Coast of India

A. Arun Kumar, R. Sivakumar, Y. Sai Rutwik, T. Nishanth, V. Revanth, Sanjeev Kumar
Pages 217-230

Self-curing Possibilities of Polygel in Ordinary Concrete

Nagesh T. Suryawanshi, Sunil B. Takare
Pages 231-239

Light Transmitting Concrete—Litracon

Ashish B. Ugale, Rushikesh R. Badnakhe, Prathmesh P. Nanhe
Pages 241-251

Interlinking of Dams to Transfer Water Under Gravity

Asmita A. Naitam, Rupesh B. Satpute, A. D. Vasudeo
Pages 253-264

Effect of Cow Urine on Municipal Solid Waste: Composition, Leachate Generated and Quality

Shivanand Kamde, P. K. Ghosh, M. K. Gupta
Pages 265-271

[Application of Tube Settlers in Water Treatment Process—A Review]

M. P. Bhorkar, A. G. Bhole, P. B. Nagarnaik
Pages 273-280

[Evaluate Properties of GPC with the Addition of an Alkaline Solution and Different Types of Fly Ash]

S. L. Hake, O. D. Waghmare, M. P. Bhorkar
Pages 281-290

[Removal of Hexavalent Chromium from Aqueous Solution by Alumina-Supported Copper Aluminum Oxide Nanoparticles]

Vivek Bhusari, Amit Bansiwal, Sadhana Rayalu
Pages 291-297

[Remote Sensing and Geographic Information System-Based Route Planning]

Priyanka Deshmukh, DSP Rao, Rajashree Botale, P. Y. Pwade
Pages 299-314

[Analysis of Foundations and Soil–Structure Interaction Using FEM—A Review]

S. M. Khanapurkar, V. R. Upadhye, M. S. Dixit
Pages 315-322

[Effect of Floor Diaphragms on Seismic Response of RCC Framed Building—A Review]

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Pages 323-333

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Mohit Manwatkar, P. Y. Pawade

Pages 347-356

Review on an Experimental Study on Concrete Strength by Using Sugarcane Bagasse Ash and Steel Fiber

S. S. Solanke, P. Y. Pawade
Pages 357-365

Analysis of Multi-storey Structures with Respect to Sequential Analysis

Nikunj D. Banugariya, S. S. Solanke
Pages 367-379

← Previous Page 2 of 4 Next →

Back to top ↑

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This book comprises select proceedings of the International Conference on Smart Technologies for Energy, Environment, and Sustainable Development (ICSTEESD 2018). The chapters are broadly divided into three focus areas, viz. energy, environment, and sustainable development, and discusses the relevance and applications of smart technologies in these fields. A wide variety of topics such as renewable energy, energy conservation and management, energy policy and planning, environmental management, marine environment, green building, smart cities, smart transportation are covered in this book. Researchers and professionals from varied engineering backgrounds contribute chapters with an aim to provide economically viable solutions to sustainable development challenges. The book will prove useful for academics, professionals, and policy makers interested in sustainable development.

Back to top ↑

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Abstract

Chromium is a toxic metal pollutant found in effluent of electroplating and metal finishing industries. Copper aluminum oxide nanoparticles supported on alumina were synthesized and evaluated for the removal of Cr(VI) from water. The CANP-A was characterized by X-ray powder diffraction, scanning electron microscopy, and transmission electron microscopy. The adsorbent was evaluated for the removal of chromium (VI) from water. The effect of adsorption time was studied. The experimental data were fitted to Langmuir and

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BOOK CHAPTER

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Energy Generation and Efficiency Technologies for Green Residential Buildings

Solar Energy Generation Technology for Small Homes

Santosh Bopche

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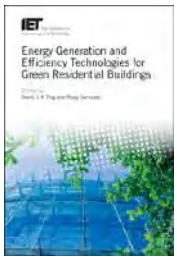

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Description

Residential buildings consume about a quarter of all energy (including electrical and thermal) in industrialized countries and emit around 20% of the carbon emissions there. Older and outdated heating and cooling technology causes high energy demand and, depending on building type, secondary causes can include ventilation and lighting. Technology is available to mitigate high energy consumption, and to enable the use of renewable or environmentally friendly energy, partly generated locally. This book, written by international experts from academia as well as industry, compiles and describes several key technologies available to reduce a residential building's energy consumption. Key themes include local energy generation, such as the use of sunlight to reduce heating needs, and photovoltaics for electricity. Case studies are included in most chapters to provide real-world context for the technologies described.

Inspec keywords: buildings (structures); renewable energy sources; sunlight; passive solar buildings; phase change materials; building integrated photovoltaics; sustainable development; energy conservation; secondary cells

Other keywords: solar radiation analysis; PV solar systems; photovoltaic arrays; efficiency; energy generation; secondary battery; solar energy generation; clean energy generation; nature-based building solutions; green residential buildings; phase change materials

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- Front Matter

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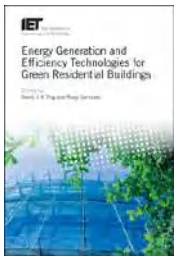

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Chapters (11)

- **Front Matter**

  p. (1)

- **1 Introduction and motivation**

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  The book chapter shows that the increasing number of buildings, the general increase in the size of dwellings, growing quality of life, and increasing home electrification are reasons for the upcoming trend in the energy consumption by this sector. Thus, moving forward, it is critical to employ more efficient energy systems based on renewable energy resources, to reduce the energy demand in this sector, and to reduce the environmental impacts of this sector.

- **2 Clean energy generation in residential green buildings**

  p. 7 –43 (37)

  Due to the recent investigations, buildings consume a considerable amount of the electricity, drinking water, global final energy use and as a result are responsible for one third of the global carbon emissions. Therefore, building sector has a key role to reach global energy targets. In this sight, this study draws attention to the sustainable energy performances of green buildings (GBs) and aims towards the GBs concept which includes renewable sources in the construction and lifetime utilization.

- **3 Performance monitoring of a 60 kW photovoltaic array in Alberta**

  p. 45 –59 (15)

  Solar photovoltaic (PV) systems are relatively new and there is not a large amount of performance data available for them with which to compare design calculations. This comparison is also necessary to provide confidence that newer systems will perform as predicted. This chapter describes a year's monitoring of a 60 kW PV system near Strathmore, Alberta, latitude 51°, installed in November 2016. The modules were flush mounted to a roof with 8° of pitch. There was no shading and the installation was near an Alberta Department of Agriculture meteorological station which provided the weather data. The measured capacity factor was 13.8%, and there was a loss of

11%-12% of the yearly production to snow. We demonstrate that satellite-based production forecasts of the array irradiance underestimated the solar resource at this location. The predictions of actual energy production from two different modeling tools showed that the more detailed System Advisor Model software was more accurate than RETScreen.

- **4 Environmental and economic evaluation of PV solar system for remote communities using building information modeling: A case study**

p. 61 –74 (14)

Photovoltaic (PV) solar energy has been a popular renewable electricity generation source at the building and community levels. With the recent rise in the demand, residential level PV installations have been under scrutiny primarily to improve their efficiency. Electricity generation potential of a roof-mounted PV system depends on the local PV potential, building orientation, shading effect, roof angle, and roof size. Moreover, the economic viability of the PV system needs to be justified before being implemented on site. This research investigates the optimal PV solar energy potential (PvSEP) of a standalone rooftop PV system using building information modeling (BIM). Two building shapes (square and rectangular), three roof types (hip, gable, and shed), eight orientations (E, W, S, N, NE, NW, SE, and SW), and nine roof slopes (starting from 10° to 50° with an interval of 5°) were analyzed at two geographical locations in British Columbia (i.e., Kelowna and Fort St. Johns). The BIM was created in the Autodesk Revit platform, and 432 simulations were performed for each location using the Revit Architecture extension Insight. Results indicated that even though location, roof angle, orientation, and roof types are significant factors for PvSEP, building shape do not have a significant impact. This has been consistent with the published literature. The PV system with the maximum PvSEP results in the minimum payback time and greenhouse gas (GHG) emissions. This research aims to aid PV system installation decision-making by using state-of-the-art technology during the pre-construction stage.

- **5 Solar energy generation technology for small homes**

p. 75 –114 (40)

This chapter presents concentrating collector-based technologies for capturing solar energy that may be utilized to produce power for energizing small homes (remotely located). The various types of existing solar thermal concentrating collectors, energy receivers of various shapes, sizes, and materials for selective surfaces, thermal energy storage systems, solar-powered heat engines, e.g., Stirling engine, solar-Rankine heat engine, solar-Brayton engine, are also presented thereof. The renewable hybrid technologies, e.g., solar power integration with biogas, geothermal and wind energy along with its advantages as well as limitations are discussed. It concludes with the challenges need to be faced in remote regions.

- **6 Numerical analysis of phase change materials for use in energy-efficient buildings**

p. 115 –148 (34)

Due to the efficient performance in energy storage density, solar thermal energy storage (TES, especially latent type) applications are drawing more attention in the research field of solar energy. Among all of the types of solar thermal storage technologies, the latent heat storage system using phase change materials is the most efficient way of storing thermal energy. It has some dominant factors such as high density energy storage and isothermal operations, i.e., very small temperature range for heat storage and removal. Thus, latent heat storage systems have greater applicability over the other types of TES systems. This chapter initially presents an analysis of a latent-type solar thermal energy storage (TES) system involving some of

the important cases carried out comprising the application of ambient conditions with various geometries and working conditions. The analysis is carried out in MATLAB® and COMSOL®, which contains transient simulations of latent heat storage functioning with 1D and 2D modeling. It comprises the validation of numerical 1D analysis with corresponding analytical solution, observation of the change in thermophysical properties at the melting point, etc. Further in this study, the phase change material (PCM) is assumed to be incorporated in a brick wall structure, which can improve its thermal performance. A 1D numerical model on COMSOL Multiphysics is developed to analyze the thermal performance of the PCM-filled brick wall unit. The numerical model and the adopted hypotheses are illustrated in detail. The comparison between temperature distributions of a simple brick wall and a brick wall with a PCM layer is presented. The results show that using the numerical tool, it can be observed that the thermal performance of the PCM-filled brick wall is efficient over the simple brick wall without PCM. This concept of the PCM-impregnated building structure is found to be successful in shifting the energy requirement of the equipped building sector from a high peak electricity demand period to an off-peak period.

- **7 Insulation materials**

p. 149 –172 (24)

Insulation is a key component of green building design. A well-insulated home should keep your space warm in the winter and cool in the summer, and this in turn cuts down carbon emissions linked to global climate change. In terms of energy efficiency, investing in high levels of insulation materials for your home is more cost-effective than investing in expensive heating technologies. Insulation materials work by resisting heat flow, measured by an R-value (the higher the R-value, the greater the insulation). R-value depends on the type of insulation, its thickness, and its density. In this sight, this study draws attention to the importance of building insulation materials in green buildings' sustainable energy performance.

- **8 Latent relationships between construction cost and energy efficiency in multifamily green buildings**

p. 173 –190 (18)

Residential buildings have accounted for more than 20% of total energy usage in the United States over the last decade. Reducing household energy consumption has environmental and economic impacts. Building scientists and construction engineers have attempted to obtain accurate energy use prediction; however, few have focused on the relationship between construction cost and energy use. This chapter investigates the associations among detailed construction cost takeoffs and actual energy use in multifamily green buildings. The researchers employ advanced machine-learning analytics to model the correlations between construction costs and energy use data collected from multifamily residential units. The findings identify cost divisions in the construction stage that significantly correlate with energy use in the operational stage. The model allows developers to predict energy consumption based on construction costs and enables them to adjust their investment strategies to amplify the energy efficiency of green building technologies.

- **9 Secondary battery technologies: a static potential for power**

p. 191 –207 (17)

Electrical energy storage (EES) systems provide various benefits of high energy efficiency, high reliability and controllability, low cost and environmental impact, and so on, by storing and retrieving energy on demand. Historically, electrochemical battery storage systems have by far spurred the greatest interest of research, offering

immediate response times, medium-to-long term storage duration and no power-rate limitations. Based on electrochemical oxidation-reduction reversible reactions, batteries can convert chemical energy stored in their active materials directly into electricity and vice versa. In this work, the most important battery technologies are reviewed and compared along with their contribution in global battery market. Lithium-ion monopolize in portable electronic devices, whereas lead-acid holds the exclusivity in automotive starting, lighting and ignition (SLI) applications and is considered as the best choice for small-to-medium scale stationary applications of uninterruptible power supply (UPS) and back-up power. In terms of safety and simplicity, both systems are considered viable options for small-scale residential applications, while advanced lead-acid and high-temperature batteries are suited in medium-to-large scale applications including commercial and industrial consumers. The most discussed aspects relating to electrochemical storage are the exhaustible material reserves which may cause their cost to increase and battery disposition which locally affects consumers and globally the whole of mankind. However, a key solution exists, namely recycling, and is supported by various processes. Once the impacts from the collection and transportation of all types of spent batteries are minimized, the field of electrochemical EES integration will be expanded more and more, resulting in a sustainable development.

- **10 A critical review with solar radiation analysis model on inclined and horizontal surfaces**

  p. 209 –232 (24)

  Utilization of renewable energy resources is gradually increasing in developing countries as well as the developed ones. Although the use of these resources is becoming increasingly important to meet energy demands, efficient use of limited resources requires planning and in-depth analysis beforehand. Correspondingly, in recent years, countries have started to work on increasing the share of renewable energy among other energy-production methods to ensure energy independence. In this study, in order to design PV system for maximum efficiency under certain climatic conditions, a comparative analysis of solar energy potential for two cities in certain climatic conditions is conducted. Based on the calculations, the values of the indicators show that potential for photovoltaic systems in both cities correspond to expected levels. The study aims to determine the most efficient solar panel by utilizing the real solar radiation values obtained for the photovoltaic system design.

- **11 Nature-based building solutions: circular utilization of photosynthetic organisms**

  p. 233 –258 (26)

  This chapter proposes a circular agricultural system for integration of naturebased solutions, mainly photosynthetic elements into buildings and cities and evaluates its potential for utilization. The proposed system consists of the integration of three main nature-based solutions into a building: green roofs that filter water, photobioreactors (PBRs) that cultivate microalgae inside and aquaponics that grow both fish and vegetables. The system is powered by solar energy and its main purpose is to grow food in the urban context. Although there have been some studies about the energy and environmental effects of integrating nature-based systems in buildings, they are usually utilized for different purposes, yet the present chapter proposes and assesses one of the first examples, where three systems are combined together.

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- « Previous Chapter
- Table of contents
- Next Chapter »

Abstract

This chapter presents concentrating collector-based technologies for capturing solar energy that may be utilized to produce power for energizing small homes (remotely located). The various types of existing solar thermal concentrating collectors, energy receivers of various shapes, sizes, and materials for selective surfaces, thermal energy storage systems, solar-powered heat engines, e.g., Stirling engine, solar-Rankine heat engine, solar-Brayton engine, are also presented thereof. The renewable hybrid technologies, e.g., solar power integration with biogas, geothermal and wind energy along with its advantages as well as limitations are discussed. It concludes with the challenges need to be faced in remote regions.
Chapter Contents:

- 5.1 Introduction
- 5.1.1 Solar thermal power plant
- 5.2 Power generation technology—An overview
- 5.2.1 Classification of concentrating solar power collector systems
- 5.2.1.1 Cylindrical parabolic trough type collector
- 5.2.1.2 Linear Fresnel collector
- 5.2.1.3 Central receiver collector or solar tower
- 5.2.1.4 Parabolic dish collector
- 5.2.2 Concentrating solar power (CSP) technology comparison
- 5.2.3 Advantages of CSP technologies
- 5.2.4 Classification of concentrating solar power receiver systems
- 5.3 Thermal energy storage
- 5.3.1 Types of energy storage
- 5.3.1.1 Sensible energy storage
- 5.3.1.2 Latent heat storage
- 5.3.1.3 Thermochemical energy storage

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Solar Energy-Systems, Challenges, and Opportunities

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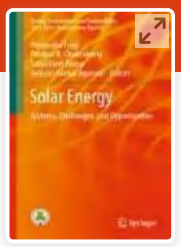

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Solar Energy

Systems, Challenges, and Opportunities

Editors: Himanshu Tyagi, Prodyut R. Chakraborty, Satvasheel Powar, Avinash Kumar Agarwal

Includes detailed discussions on sustainable and clean energy sources

Provides a wide overview of the relevant and current topics

Adopts an analytical approach to solutions of solar energy technologies

Part of the book series: Energy, Environment, and Sustainability (ENENSU)

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Sections

Table of contents

About this book

Keywords

Editors and Affiliations
About the editors
Bibliographic Information
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Table of contents (18 chapters)

Search within book

← Previous Page 1 of 2 Next →

Front Matter PDF
Pages i-xv

General

Front Matter PDF
Pages 1-1

Introduction to Solar Energy: Systems, Challenges, and Opportunities
Himanshu Tyagi, Prodyut R. Chakraborty, Satvasheel Powar, Avinash Kumar Agarwal
Pages 3-12

Sustainable Development Goals in Context to BRICS Countries
Bhabajit Baruah, Rakesh Nath
Pages 13-22

Installations of Solar Systems in Remote Areas of Himachal Pradesh, INDIA: Challenges and Opportunities
Santosh B. Bopche

Pages 23-34

Utilising Passive Design Strategies for Analysing Thermal Comfort Levels Inside an Office Room Using PMV-PPD Models

Sana Fatima Ali, Dibakar Rakshit
Pages 35-57

Solar Thermal Systems: Heating

Front Matter PDF

Pages 59-59

Design and Development of a Concentrated Solar Water Heating System

Bandi Sai Mukesh, Ravi Teja Parella, Sudipto Mukhopadhyay, Laltu Chandra
Pages 61-75

Multi-objective Performance Optimization of a Ribbed Solar Air Heater

Naveen Sharma, Rajesh Choudhary
Pages 77-93

Mathematical Modelling of Solar Updraft Tower

K. V. S. Teja, Kapil Garg, Himanshu Tyagi
Pages 95-114

Solar Thermal Systems: Cooling

Front Matter PDF

Pages 115-115

Solar Thermal-Powered Adsorption Chiller

Mahbubul Muttakin, Kazuhide Ito, Bidyut Baran Saha
Pages 117-146

TEWI Assessment of Conventional and Solar Powered Cooling Systems

Md. Amirul Islam, Bidyut Baran Saha

Pages 147-177

Thermodynamic Analysis of Activated Carbon–Ethanol and Zeolite–Water Based Adsorption Cooling Systems

Satish Sangwan, Prodyut R. Chakraborty
Pages 179-204

Energy Storage

Front Matter

PDF

Pages 205-205

PCM-Metal Foam Composite Systems for Solar Energy Storage

Anirban Bhattacharya
Pages 207-234

Direct Photo-Thermal Energy Storage Using Nanoparticles Laden Phase Change Materials

Deepak Moudgil, Vikrant Khullar
Pages 235-246

Review on PCM Application for Cooling Load Reduction in Indian Buildings

Rajat Saxena, Dibakar Rakshit, S. C. Kaushik
Pages 247-275

Fabrication and Thermal Performance Evaluation of Metastable Supercooled Liquid PCM Based Heat Pack

Rohitash Kumar, Sumita Vyas, Bobin Mondal, Ravindra Kumar, Ambesh Dixit
Pages 277-282

Solar Cells

Front Matter

PDF

Pages 283-283

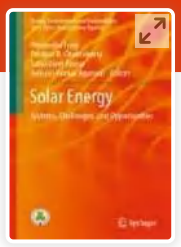

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Table of contents

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Table of contents (18 chapters)

Search within book

← Previous Page 1 of 2 Next →

Front Matter PDF
Pages i-xv

General

Front Matter PDF
Pages 1-1

Introduction to Solar Energy: Systems, Challenges, and Opportunities
Himanshu Tyagi, Prodyut R. Chakraborty, Satvasheel Powar, Avinash Kumar Agarwal
Pages 3-12

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Pages 13-22

Installations of Solar Systems in Remote Areas of Himachal Pradesh, INDIA: Challenges and Opportunities
Santosh B. Bopche

Pages 23-34

Utilising Passive Design Strategies for Analysing Thermal Comfort Levels Inside an Office Room Using PMV-PPD Models

Sana Fatima Ali, Dibakar Rakshit
Pages 35-57

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Front Matter PDF

Pages 59-59

Design and Development of a Concentrated Solar Water Heating System

Bandi Sai Mukesh, Ravi Teja Parella, Sudipto Mukhopadhyay, Laltu Chandra
Pages 61-75

Multi-objective Performance Optimization of a Ribbed Solar Air Heater

Naveen Sharma, Rajesh Choudhary
Pages 77-93

Mathematical Modelling of Solar Updraft Tower

K. V. S. Teja, Kapil Garg, Himanshu Tyagi
Pages 95-114

Solar Thermal Systems: Cooling

Front Matter PDF

Pages 115-115

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Pages 117-146

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Pages 147-177

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Satish Sangwan, Prodyut R. Chakraborty
Pages 179-204

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Front Matter

PDF

Pages 205-205

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Pages 207-234

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Pages 235-246

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Rohitash Kumar, Sumita Vyas, Bobin Mondal, Ravindra Kumar, Ambesh Dixit
Pages 277-282

Solar Cells

Front Matter

PDF

Pages 283-283

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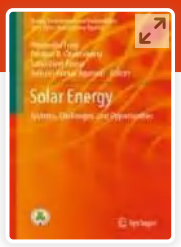
Menu Search Cart



Solar Energy pp 23–34

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Abstract

The renewable energy is an energy obtained from natural replenishable resources. It consists of wind, water power, tidal power, solar, biomass and energy recovered from wastes. The solar energy is available at free of cost and cleanest source of renewable type energy that can be utilized as a better substitute to the fossil fuel energy. These days lot of research is going on in extracting maximum possible heat energy from the solar irradiation. From solar systems practicability and remotely located societal upliftment point of view, it's a big challenge to erect and run continuously or

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SR. NO - 23

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Smart Technologies for Energy, Environment and Sustainable Development

Issue regarding stability aspects when SCIG and DFIG are interacting with grid with FACTS devices

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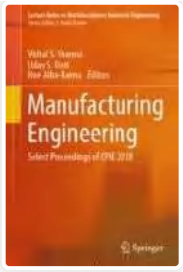

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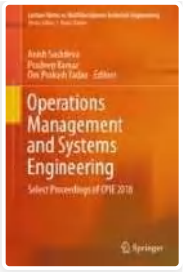

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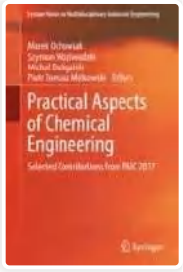

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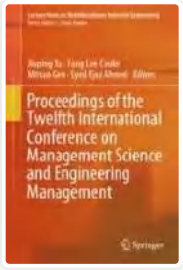

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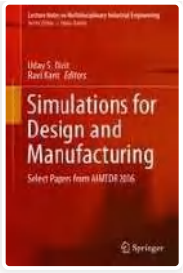

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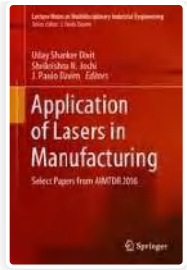

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← Previous 1 2 3 4 Next →

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Sections

Table of contents

About this book

Keywords

Editors and Affiliations

About the editors

Bibliographic Information

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Table of contents (76 papers)

Search within book

← Previous Page 1 of 4 Next →

Front Matter PDF

Pages i-xvi

Sustainable Electrical Energy Systems

Front Matter PDF

Pages 1-1

Solar Power Plant at Shradha Park and Optimal Solution to Improve the Advancement in Technology—A Case Study

Devesh U. Sarkar, Manish J. Katira

Pages 3-9

Implementation of Single-Phase SRF (d-q) Theory for Control Technique in DVR Restoring Voltage Sag in Sensitive Nonlinear Load

D. N. Katole, M. B. Daigavane, P. M. Daigavane
Pages 11-22

Performance Degradation of Discrete PID Controller for Digital Excitation Control System Due to Variation of Sampling Time

Deepak M. Sajnekar, Sadanand B. Deshpande, Mohan Lal Kolhe, N. Patidar
Pages 23-28

Bidirectional Voltage Source Converter for Microgrid

Meghana Khobragade, Harshit S. Dalvi, Prashant Jagtap
Pages 29-40

Smart HVAC System Using Fuzzy Logic

Aditya Ghulghule, Harshal Khandekar
Pages 41-51

Analysis and Optimization Technique of Secure Smart Grid Communication Network for Sustainable Development

Devendra Singh Kushwaha, Ruchi Jain, Mohan Lal Kolhe, Vikash Kumar Singh
Pages 53-61

Issues Regarding Stability Aspects When SCIG and DFIG Are Interacting with Grid with FACTS Devices

Harshit S. Dalvi, Vinod K. Chandrakar
Pages 63-69

Techno-economical and Feasibility Analysis of Hybrid PV–Wind System–Case Study

Jyoti B. Fulzele, M. B. Daigavane, P. M. Daigavane
Pages 71-82

Design and Simulation of Photovoltaic Water Pumping System

Sachin Wadhankar, Bhagyashri Charjan
Pages 83-92

[Maximum Power Point Tracker for Standalone PV System Using Neural Networks]

K. M. S. Y. Konara, Mohan Lal Kolhe, M. A. N. Sanjeewa, W. T. V. S. Fernando, G. M. N. Priyashantha, J. W. G. S. Weerasinghe
Pages 93-101

[Industrialized Safekeeping Arrangement With GSM Scheme Using Proteus Software]

Rashmi Ashok Panherkar, Prajakta Vaidya
Pages 103-110

[Topology and Control of Hybrid Nine-Level Inverter]

Y. Naveen Kumar, P. P. Jagtap
Pages 111-118

[Leveraging Education Sector Using Cognitive Big Data for the Recruitment Process and Sustainable Development]

Ruchi Jain, Devendra Singh Kushwaha, Mohan Lal Kolhe, Vikash Kumar Singh
Pages 119-126

[Energy Assessment on Double Power Generation System of Building Integrated Photovoltaic and Fuel Cell]

Akira Nishimura
Pages 127-133

[Analysis of Switched Reluctance Motor for Reduction in the Torque Ripple Without Controller]

Megha Chaple, Sanjay Bodkhe, Prema Daigavane
Pages 135-139

[Overview of the Controllers Used for Mitigation of Harmonics Injected Due to Nonlinear Loads]

Kanchan Vipul Narode, Asha Shendge
Pages 141-150

Front Matter

PDF

Pages 151-152

Study of Properties of Coal Bottom Ash and Waste Foundry Sand and its Use in Concrete

Aasif Baig, Valsson Varghese

Pages 153-163

← Previous Page 1 of 4 Next →

Back to top ↑

About this book

This book comprises select proceedings of the International Conference on Smart Technologies for Energy, Environment, and Sustainable Development (ICSTEESD 2018). The chapters are broadly divided into three focus areas, viz. energy, environment, and sustainable development, and discusses the relevance and applications of smart technologies in these fields. A wide variety of topics such as renewable energy, energy conservation and management, energy policy and planning, environmental management, marine environment, green building, smart cities, smart transportation are covered in this book. Researchers and professionals from varied engineering backgrounds contribute chapters with an aim to provide economically viable solutions to sustainable development challenges. The book will prove useful for academics, professionals, and policy makers interested in sustainable development.

Back to top ↑

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Log in

Menu Search Cart

Smart Technologies for Energy, Environment and Sustainable Development pp 63–69

Issues Regarding Stability Aspects When SCIG and DFIG Are Interacting with Grid with FACTS Devices

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Abstract

This paper focused on stability studies when many generators are integrated with induction generator (IG) and doubly fed induction generator (DFIG). As power system is a complex phenomena and reactive power compensation is a global issue, it needs to be addressed specially during transient conditions. The FACTS devices are best suited for compensation of reactive power. The focus is on multimachine system which is considered for analysis purpose. During transients, the performance of SVC and STATCOM was

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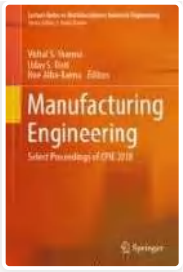

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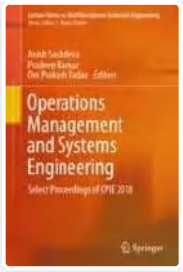

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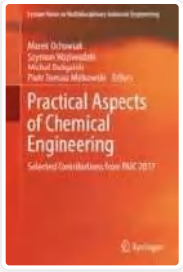

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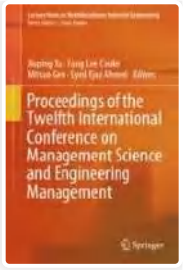

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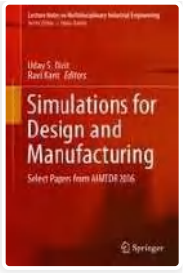

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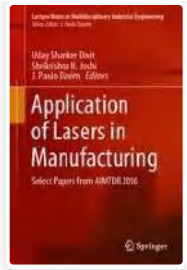

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Table of contents

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Table of contents (76 papers)

Search within book

← Previous Page 1 of 4 Next →

Front Matter PDF

Pages i-xvi

Sustainable Electrical Energy Systems

Front Matter PDF

Pages 1-1

Solar Power Plant at Shradha Park and Optimal Solution to Improve the Advancement in Technology—A Case Study

Devesh U. Sarkar, Manish J. Katira

Pages 3-9

Implementation of Single-Phase SRF (d-q) Theory for Control Technique in DVR Restoring Voltage Sag in Sensitive Nonlinear Load

D. N. Katole, M. B. Daigavane, P. M. Daigavane
Pages 11-22

Performance Degradation of Discrete PID Controller for Digital Excitation Control System Due to Variation of Sampling Time

Deepak M. Sajnekar, Sadanand B. Deshpande, Mohan Lal Kolhe, N. Patidar
Pages 23-28

Bidirectional Voltage Source Converter for Microgrid

Meghana Khobragade, Harshit S. Dalvi, Prashant Jagtap
Pages 29-40

Smart HVAC System Using Fuzzy Logic

Aditya Ghulghule, Harshal Khandekar
Pages 41-51

Analysis and Optimization Technique of Secure Smart Grid Communication Network for Sustainable Development

Devendra Singh Kushwaha, Ruchi Jain, Mohan Lal Kolhe, Vikash Kumar Singh
Pages 53-61

Issues Regarding Stability Aspects When SCIG and DFIG Are Interacting with Grid with FACTS Devices

Harshit S. Dalvi, Vinod K. Chandrakar
Pages 63-69

Techno-economical and Feasibility Analysis of Hybrid PV–Wind System–Case Study

Jyoti B. Fulzele, M. B. Daigavane, P. M. Daigavane
Pages 71-82

Design and Simulation of Photovoltaic Water Pumping System

Sachin Wadhankar, Bhagyashri Charjan
Pages 83-92

[Maximum Power Point Tracker for Standalone PV System Using Neural Networks]

K. M. S. Y. Konara, Mohan Lal Kolhe, M. A. N. Sanjeewa, W. T. V. S. Fernando, G. M. N. Priyashantha, J. W. G. S. Weerasinghe
Pages 93-101

[Industrialized Safekeeping Arrangement With GSM Scheme Using Proteus Software]

Rashmi Ashok Panherkar, Prajakta Vaidya
Pages 103-110

[Topology and Control of Hybrid Nine-Level Inverter]

Y. Naveen Kumar, P. P. Jagtap
Pages 111-118

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Ruchi Jain, Devendra Singh Kushwaha, Mohan Lal Kolhe, Vikash Kumar Singh
Pages 119-126

[Energy Assessment on Double Power Generation System of Building Integrated Photovoltaic and Fuel Cell]

Akira Nishimura
Pages 127-133

[Analysis of Switched Reluctance Motor for Reduction in the Torque Ripple Without Controller]

Megha Chaple, Sanjay Bodkhe, Prema Daigavane
Pages 135-139

[Overview of the Controllers Used for Mitigation of Harmonics Injected Due to Nonlinear Loads]

Kanchan Vipul Narode, Asha Shendge
Pages 141-150

Front Matter

PDF

Pages 151-152

Study of Properties of Coal Bottom Ash and Waste Foundry Sand and its Use in Concrete

Aasif Baig, Valsson Varghese

Pages 153-163

← Previous Page 1 of 4 Next →

Back to top ↑

About this book

This book comprises select proceedings of the International Conference on Smart Technologies for Energy, Environment, and Sustainable Development (ICSTEESD 2018). The chapters are broadly divided into three focus areas, viz. energy, environment, and sustainable development, and discusses the relevance and applications of smart technologies in these fields. A wide variety of topics such as renewable energy, energy conservation and management, energy policy and planning, environmental management, marine environment, green building, smart cities, smart transportation are covered in this book. Researchers and professionals from varied engineering backgrounds contribute chapters with an aim to provide economically viable solutions to sustainable development challenges. The book will prove useful for academics, professionals, and policy makers interested in sustainable development.

Back to top ↑

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Smart Technologies for Energy, Environment and Sustainable Development pp 29–40

Bidirectional Voltage Source Converter for Microgrid

Meghana Khobragade, Harshit S. Dalvi & Prashant Jagtap

Conference paper | First Online: 03 July 2019

730 Accesses

Part of the Lecture Notes on Multidisciplinary Industrial Engineering book series (LNMUINEN)

Abstract

Microgrid is a small-scale power supply network associated with Distributed Energy Resources. Nowadays DC microgrid has become a new subject of research due to addition of renewable energy sources and electric vehicles for small buildings and residential. In this paper, we have taken review of previous published work and based on that we proposed solar-based bidirectional VSC-based Battery Storage System for microgrid applications using flyback converters. To done so, we have make DC bus which takes DC voltage from solar panel stored in battery and given to dc load

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SR. NO - 25

Flexible A.C. Transmission System (FACTS) Devices with Energy Storage System

Kantilal D Joshi

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by Dr. Kantilal Joshi (Author)

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This book is basically the work done by me during my PhD work at G.H.Raisoni College of Engineering, Nagpur. The book contains a survey of Energy storage systems, Simulations in MATLAB for Supercapacitors and SMES and applications to power systems. The book can be useful for all Undergraduate and Post graduate students of Electrical Engineering, interested in this area.

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SR. NO - 26

Lecture Notes on Multidisciplinary Industrial Engineering

Advances in Additive Manufacturing and Joining: Lecture Notes on Multidisciplinary Industrial Engineering

A Study on Hardness of CRNO Electrical Sheets for Edge Joining Through TIG Welding

Bhushan Y. Dharmik

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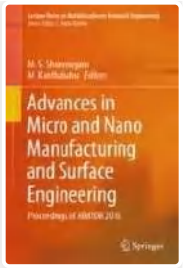

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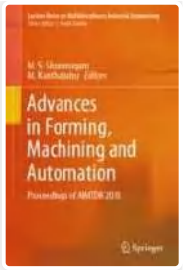

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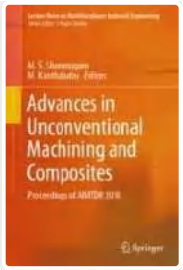

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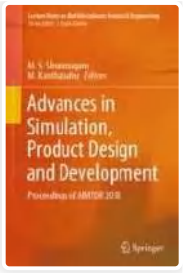

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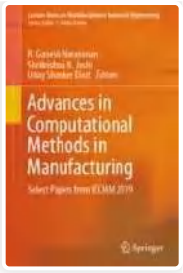

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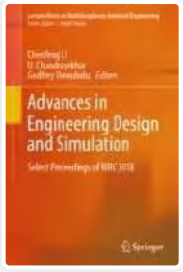

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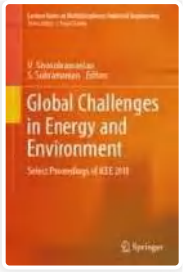

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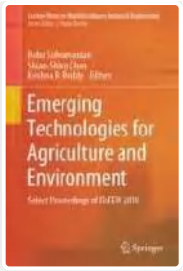

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Advances in Additive Manufacturing and Joining

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Sections

Table of contents
About this book
Keywords
Editors and Affiliations
About the editors
Bibliographic Information
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Table of contents (66 papers)

Search within book

← Previous Page 4 of 4 Next →

Joining

Influence of Perturbations on Actuation Characteristics of Friction Stir Welded Shape Memory Alloy

S. S. Mani Prabu, R. Mithun, Suhel Khan, S. Jayachandran, M. Manikandan, Yeshwanth Sai et al.
Pages 661-668

Ultrasonic Welding of Molybdenum Using Aluminium Interlayer

Sanjay Kumar Patel, Harshit K. Dave, Himanshu V. Patel
Pages 669-677

Experimental Investigation and Mechanical Characterization of Double-Sided Submerged

Arc Welding of AISI 304 Austenitic Stainless Steel

P. V. S. S. Sridhar, Shailesh Kumar, Kaushik Pal, Bhaskar Kumar Chakraborty, Rituraj Bhattacharjee, Subhashis Majumder et al.
Pages 679-688

A Study on Hardness of CRNO Electrical Sheets for Edge Joining Through TIG Welding

Bhushan Y. Dharmik, Nitin K. Lautre
Pages 689-698

Friction Stir Welding for Joining of Dissimilar Materials

Suryakanta Sahu, Omkar Mypati, Soumya Sangita Nayak, Pooja Sarkar, Surjya Kanta Pal, Shiv Brat Singh
Pages 699-709

Effect of Process Parameters on Quality Characteristics of Al/Cu Dissimilar Friction Stir Welding Joint

A. Mandal, J. D. Barma, A. Bandyopadhyay
Pages 711-717

Numerical Simulation to Predict Temperature Distribution and Weld Profile in Laser Beam Welding of Carbon Steel St37 and Mechanical Properties

Pramod Kumar, Amar Nath Sinha
Pages 719-726

Influence of Friction Pressure/Time on Mechanical and Microstructural Characteristics of Rotary Friction Welded LM25/10% SiC Aluminium Matrix Composites

M. Abdul Ghani Khan, S. Rajakumar, T. Pragatheswaran
Pages 727-739

Effect of Holding Time on Microstructural Characteristics and Mechanical Properties of Ti64 Diffusion Bonds

T. Pragatheswaran, S. Rajakumar, V. Balasubramanian, Vijay Petley, Shweta Verma
Pages 741-749

← Previous Page 4 of 4 Next →

Back to top ↑

About this book

This volume presents research papers on additive manufacturing (popularly known as 3D printing) and joining which were presented during the 7th International and 28th All India Manufacturing Technology, Design and Research conference 2018 (AIMTDR 2018). The contents of this volume present the latest technological advancements for improving the efficiency, accuracy and speed of the additive manufacturing process and in fusion and solid-state welding technologies, with a variety of technologies, including fused deposition modelling, poly jet 3D printing, weld deposition based technology, selective laser melting and important welding technologies being covered. This volume will be of interest to academicians, researchers, and practicing engineers alike.

Back to top ↑

Keywords

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Menu Search Cart

Advances in Additive Manufacturing and Joining pp 689–698

A Study on Hardness of CRNO Electrical Sheets for Edge Joining Through TIG Welding

Bhushan Y. Dharmik & Nitin K. Lautre

Conference paper | First Online: 17 October 2019

1986 Accesses | **4** Citations

Part of the Lecture Notes on Multidisciplinary Industrial Engineering book series (LNMUINEN)

Abstract

Tungsten inert gas (TIG) welding is gaining popularity on welding of cold-rolled non-oriented (CRNO) electrical steel. The process deals with welding of stacks of thin sheets generally used as cores of electric vehicles and other electrical systems. Welding of thin sheets is affected by large amount of heat input. An investigation on the hardness of material post-welding is carried out. The hardness of the base metal, heat-affected zone, and fusion zone shows a different trend for an input current. The observed current setting at 60 A generated a minimum hardness on welded sheets

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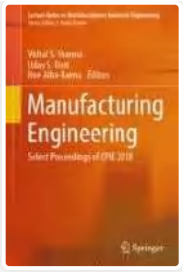

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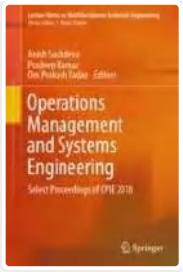

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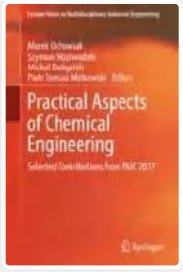

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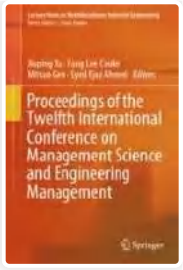

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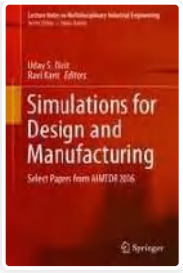

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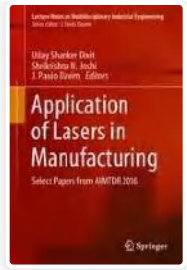

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Table of contents
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Table of contents (47 papers)

Search within book

← Previous Page 1 of 3 Next →

Front Matter PDF

Pages i-ix

Effect of Magnetic Field to Reduce Emissions and Improve Combustion Performance in a Spark-Ignition Engine

Vishnu Sankar, Sanath M. Chandran, Tharun Tomy, Unni Raj, Vivek Samson, K. Ramachandran

Pages 1-10

Experimental Investigation on Reverse Engineering Techniques Employing Response Surface Methodology for Freeform Surfaces

G. Sreeram Reddy, V. V. Satyanarayana, Manzoor Hussain, J. Jagadesh Kumar

Pages 11-20

Effect of Process Parameters and Cryotreated Post Tempered Electrodes on the Radial Overcut of AISI 304 During EDM: A Comparative Study

Munmun Bhaumik, Kalipada Maity

Pages 21-28

Shrinkage Porosity Reduction in Aluminium Alloy A356 Using Simulation Tool with Assisted Rapid Prototyping Casting

Suresh Laxman Chittewar, Rajesh M. Metkar, Santosh Tanaji Ghutukade
Pages 29-38

Finite Element Analysis of Rail Vehicle Suspension Spring for Its Fatigue Life Improvement

M. A. Kumbhalkar, D. V. Bhope, A. V. Vanalkar
Pages 39-53

Analysis of Optimized Roller Burnishing Parameters Using ANSYS

Priyanka S. Yadav, Dayanand A. Ghatge
Pages 55-61

Resistance Spot Welding of Cold Rolled Mild Steel with Filler Metal

Sushil T. Ambadkar, Deepak V. Bhope
Pages 63-73

Study on Squeeze Casting of Aluminum Matrix Composites—A Review

L. Natrayan, M. Senthil Kumar
Pages 75-83

Development and Investigation of Microstructure and Mechanical Properties of Cast and Hot Forged AL2014-TIB2 In Situ Composite by Stir Casting

M. Senthil Kumar, R. D. Hemanth, B. Ashok Kumar, M. Venkateswarlu, P. Kuppan
Pages 85-91

Mechanical Characterization and Comparative Evaluation of the Different Combination of Natural and Glass Fiber Reinforced Hybrid Epoxy Composites

C. M. Meenakshi, A. Krishnamoorthy
Pages 93-101

Use of Polylactic Acid (PLA) Material for Asymmetric Spur Gear Manufactured by 3-D

Printing

Laxman B. Abhang, Akshay Govardhan Dekhane
Pages 103-113

Tribological Study of AA2024-B4C Composites Using ANOVA

Bhargavi Rebba, N. Ramanaiah, S. Rajesh
Pages 115-127

A Review on Effects of Various Parameters in Modulated Tool Path (MTP) Machining

P L. Jayananthan, B. Aravind Kumar
Pages 129-137

Machining of Difficult to Cut Materials by Electrochemical Discharge Machining (ECDM) Process: A State of Art Approach

Manpreet Singh, Sarbjit Singh
Pages 139-149

Development of Super Hydrophobic Surfaces for Oil Spill Separation

Alex K. Babu, Alwinson Kuriakose Geevarghese, Althaf Easa, Anthea Judette Maxi Fernandez, Rakesh Reghunath, Soney C. George et al.
Pages 151-162

FEA Study of the Multiple Structural Orientations on Selective Laser Melted Cobalt Chrome Open-Porous Scaffolds

Aby K. Abraham, V. G. Sridhar
Pages 163-170

Effect of Silicon Carbide as Filler Reinforcement on the Mechanical Properties of Glass Fiber Epoxy Composites

Antara Bhattacharjee, S. Sujaykhosh, B. K. Nanda
Pages 171-176

Optimization of Weld Bead Geometry of C263 Nimonic Alloy Electron Beam Weld Joints

Shaik Rifshu Hussain, K. P. V. Krishna Varma, Sriniwash Anand, C. Lavanya
Pages 177-190

[Development of a System for Simultaneous Rotation of Multiple Stacks of Uranium Dioxide Pellets]

M. Sriniwash Anand, Meesala Shivasai, G. Sai Sasank, Gorkala Madhu, Shaik Rifshu Hussain
Pages 191-202

← Previous Page 1 of 3 Next →

Back to top ↑

About this book

This book presents selected papers from the international conference on advanced manufacturing and materials sciences (**ICAMMS 2018). The papers reflet** recent advances in manufacturing sector focusing on process optimization and give emphasis to testing and evaluation of new materials with potential use in industrial applications.

Back to top ↑

Keywords

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Back to top ↑

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Menu Search Cart

Advanced Manufacturing and Materials Science pp 39–53

Finite Element Analysis of Rail Vehicle Suspension Spring for Its Fatigue Life Improvement

M. A. Kumbhalkar, D. V. Bhope & A. V. Vanalkar

Conference paper | First Online: 01 June 2018

1122 Accesses | **4** Citations

Part of the Lecture Notes on Multidisciplinary Industrial Engineering book series (LNMUINEN)

Abstract

Suspension spring is the imperative segment of moving body to assimilate shock and vibration. This paper discusses the finite element analysis of helical suspension spring of rail vehicle to discover its fatigue life. Fatigue analysis has been carried out using finite element method to explore the impact of dynamic loading on the failure of suspension spring. This analysis revealed that the suspension spring has finite life and due to which spring failure occurs earlier. To avoid these failures some modifications are suggested in the suspension system and one of them is

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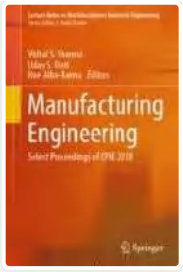

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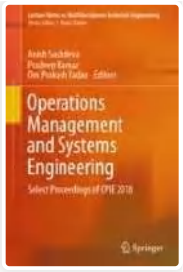

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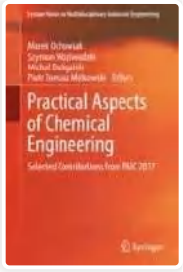

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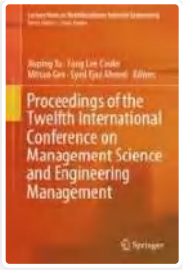

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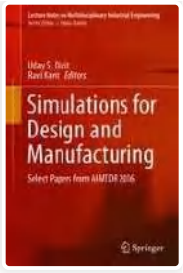

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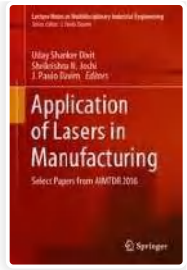

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Sections

Table of contents
About this book
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Editors and Affiliations
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Table of contents (47 papers)

Search within book

← Previous Page 1 of 3 Next →

Front Matter PDF

Pages i-ix

Effect of Magnetic Field to Reduce Emissions and Improve Combustion Performance in a Spark-Ignition Engine

Vishnu Sankar, Sanath M. Chandran, Tharun Tomy, Unni Raj, Vivek Samson, K. Ramachandran

Pages 1-10

Experimental Investigation on Reverse Engineering Techniques Employing Response Surface Methodology for Freeform Surfaces

G. Sreeram Reddy, V. V. Satyanarayana, Manzoor Hussain, J. Jagadesh Kumar

Pages 11-20

Effect of Process Parameters and Cryotreated Post Tempered Electrodes on the Radial Overcut of AISI 304 During EDM: A Comparative Study

Munmun Bhaumik, Kalipada Maity

Pages 21-28

Shrinkage Porosity Reduction in Aluminium Alloy A356 Using Simulation Tool with Assisted Rapid Prototyping Casting

Suresh Laxman Chittewar, Rajesh M. Metkar, Santosh Tanaji Ghutukade
Pages 29-38

Finite Element Analysis of Rail Vehicle Suspension Spring for Its Fatigue Life Improvement

M. A. Kumbhalkar, D. V. Bhope, A. V. Vanalkar
Pages 39-53

Analysis of Optimized Roller Burnishing Parameters Using ANSYS

Priyanka S. Yadav, Dayanand A. Ghatge
Pages 55-61

Resistance Spot Welding of Cold Rolled Mild Steel with Filler Metal

Sushil T. Ambadkar, Deepak V. Bhope
Pages 63-73

Study on Squeeze Casting of Aluminum Matrix Composites—A Review

L. Natrayan, M. Senthil Kumar
Pages 75-83

Development and Investigation of Microstructure and Mechanical Properties of Cast and Hot Forged AL2014-TIB2 In Situ Composite by Stir Casting

M. Senthil Kumar, R. D. Hemanth, B. Ashok Kumar, M. Venkateswarlu, P. Kuppan
Pages 85-91

Mechanical Characterization and Comparative Evaluation of the Different Combination of Natural and Glass Fiber Reinforced Hybrid Epoxy Composites

C. M. Meenakshi, A. Krishnamoorthy
Pages 93-101

Use of Polylactic Acid (PLA) Material for Asymmetric Spur Gear Manufactured by 3-D

Printing

Laxman B. Abhang, Akshay Govardhan Dekhane
Pages 103-113

Tribological Study of AA2024-B4C Composites Using ANOVA

Bhargavi Rebba, N. Ramanaiah, S. Rajesh
Pages 115-127

A Review on Effects of Various Parameters in Modulated Tool Path (MTP) Machining

P L. Jayananthan, B. Aravind Kumar
Pages 129-137

Machining of Difficult to Cut Materials by Electrochemical Discharge Machining (ECDM) Process: A State of Art Approach

Manpreet Singh, Sarbjit Singh
Pages 139-149

Development of Super Hydrophobic Surfaces for Oil Spill Separation

Alex K. Babu, Alwinson Kuriakose Geevarghese, Althaf Easa, Anthea Judette Maxi Fernandez, Rakesh Reghunath, Soney C. George et al.
Pages 151-162

FEA Study of the Multiple Structural Orientations on Selective Laser Melted Cobalt Chrome Open-Porous Scaffolds

Aby K. Abraham, V. G. Sridhar
Pages 163-170

Effect of Silicon Carbide as Filler Reinforcement on the Mechanical Properties of Glass Fiber Epoxy Composites

Antara Bhattacharjee, S. Sujaykhosh, B. K. Nanda
Pages 171-176

Optimization of Weld Bead Geometry of C263 Nimonic Alloy Electron Beam Weld Joints

Shaik Rifshu Hussain, K. P. V. Krishna Varma, Sriniwash Anand, C. Lavanya
Pages 177-190

[Development of a System for Simultaneous Rotation of Multiple Stacks of Uranium Dioxide Pellets]

M. Sriniwash Anand, Meesala Shivasai, G. Sai Sasank, Gorkala Madhu, Shaik Rifshu Hussain
Pages 191-202

← Previous Page 1 of 3 Next →

Back to top ↑

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This book presents selected papers from the international conference on advanced manufacturing and materials sciences (**ICAMMS 2018). The papers reflet** recent advances in manufacturing sector focusing on process optimization and give emphasis to testing and evaluation of new materials with potential use in industrial applications.

Back to top ↑

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Back to top ↑

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Advanced Manufacturing and Materials Science pp 63–73

Resistance Spot Welding of Cold Rolled Mild Steel with Filler Metal

Sushil T. Ambadkar & Deepak V. Bhope

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Abstract

Filler metal addition has been investigated as an effective way to enhance mechanical properties of cold rolled mild steel in resistance spot welding. In the present study, filler metal from 30 to 80 mg was added to the spot weld to study its effect on mechanical behaviour of spot weldments. The composition of the filler metal added was same as that of base metal. Effects of the filler metal and its quantity on failure mode was discussed on 1.5- mm-thick CRM steel for the first time. Concerning the practical application, sensitivity of the filler metal addition to spot weldments to variation in welding current and