# Table of Contents

Preface .................................................................................................................................................. xix

Chapter 1  
A Review of Soft Computing Methods Application in Rock Mechanic Engineering .......................... 1  
*Nurcihan Ceryan, Balikesir University, Turkey*

Chapter 2  
A Multiphysics Based Finite Element Approach to Evaluate the Reliability of IC Packages .......... 71  
*Padmanabhan Krishnan, VIT University, India*

Chapter 3  
Nonlinear Vibration Control of 3D Irregular Structures Subjected to Seismic Loads ...................... 103  
*Dookie Kim, Kunsan National University, South Korea*  
*Md Kamrul Hassan, Kunsan National University, South Korea*  
*Seongkyu Chang, Kunsan National University, South Korea*  
*Yasser Bigdeli, Kunsan National University, South Korea*

Chapter 4  
Multiobjective Optimization in Water and Environmental Systems Management- MODE Approach ........................................................................................................................................... 120  
*Janga Reddy Manne, Indian Institute of Technology, India*

Chapter 5  
Artificial Intelligent Approaches for Prediction of Longitudinal Wave Velocity in Rocks ............... 137  
*A. K. Verma, Indian School of Mines, India*  
*T. N. Singh, Indian Institute of Technology, India*  
*Sachin Maheshwar, Indian School of Mines, India*

Chapter 6  
Simulation-Based Approaches for Ecological Niche Modelling: A Geospatial Reference ............... 148  
*Anusheema Chakraborty, TERI University, India*  
*P K Joshi, Jawaharlal Nehru University, India*

Chapter 7  
A Hybrid Approach using the Bees Algorithm and Fuzzy-AHP for Supplier Selection .................. 171  
*Baris Yuce, Cardiff University, UK*  
*Ernesto Mastrocinque, Royal Holloway, University of London, UK*
Chapter 8
Spatial Variability Analysis of Soil Properties using Geostatistics .................................................... 195
  Anand J Puppala, The University of Texas at Arlington, USA
  Tejo V Bheemasetti, The University of Texas at Arlington, USA
  Haifeng Zou, Southeast University, China
  Xinbao Yu, The University of Texas at Arlington, USA
  Aravind Pedarla, The University of Texas at Arlington, USA
  Guojun Cai, Southeast University, China

Chapter 9
Artificial Neural Networks and Learning Techniques ................................................................. 227
  Pushpendu Kar, Indian Institute of Technology Kharagpur, India
  Anusua Das, Darmstadt University of Applied Sciences, Germany

Chapter 10
Challenges Faced in Enhancing the Performance and Scalability in Parallel Computing Architecture. ................................................................. 252
  M. Narayana Moorthi, SCSE-VIT University, India
  R. Manjula, SCSE-VIT University, India

Chapter 11
Adaptive Fuzzy Modeling using Orthonormal Basis Functions for Network Traffic Flow Control ................................................................. 270
  Flávio Henrique Teles Vieira, Federal University of Goiás, Brazil
  Flávio Geraldo Coelho Rocha, Federal University of Goiás, Brazil
  Álisson Assis Cardoso, Federal University of Goiás, Brazil

Chapter 12
Prediction of Temperature in Buildings using Machine Learning Techniques................................. 314
  Juan José Carrasco, University of Valencia, Spain
  Juan Caravaca, University of Valencia, Spain
  Mónica Millán-Giraldo, University of Valencia, Spain
  Gonzalo Vergara, University of Valencia, Spain
  José M. Martínez-Martínez, University of Valencia, Spain
  Javier Sanchis, ai2-Universitat Politècnica de València, Spain
  Emilio Soria-Olivas, University of Valencia, Spain

Chapter 13
Molecular Dynamics Simulation of Asphaltic Material: Molecular Dynamics Simulations of Oxidative Aging of Asphalt Molecules under Stress and Moisture ........................................ 334
  Rafiqul A. Tarefder, University of New Mexico, USA
  Jielin Pan, University of New Mexico, USA
  Mohammad I. Hossain, Bradley University, USA
Chapter 14
Reliability-Based Criteria for the Decision of the Compensation of Corroded Flexural Reinforcement .......................................................... 364
Ashraf Ragab Mohamed, Alexandria University, Egypt

Chapter 15
Liquefaction Modelling of Granular Soils using Discrete Element Method ................. 381
Neelima Satyam, International Institute of Information Technology, India

Chapter 16
Reliability Design of Footings in Cohesionless Soils using Soft Computing Metamodelings........ 442
Anthony T. C. Goh, Nanyang Technological University, Singapore
Wengang Zhang, Nanyang Technological University, Singapore

Chapter 17
Simulation of Temperature and Precipitation under the Climate Change Scenarios: Integration of a GCM and Machine Learning Approaches ................................................................. 465
Umut Okkan, Balikesir University, Turkey
Gul Inan, Middle East Technical University, Turkey

Chapter 18
Variable Significance in the Determination of Friction Factor in Alluvial Channel ................. 492
Kumar B, Indian Institute of Technology, India
Sreenivasulu G, RGM College of Engineering and Technology, India

Chapter 19
A Hybrid Meta-Heuristic Method Based on Firefly Algorithm and Krill Herd ...................... 505
Gai-Ge Wang, Jiangsu Normal University, China
Amir H. Gandomi, Michigan State University, USA
Amir H. Alavi, Michigan State University, USA
Yong-Quan Dong, Jiangsu Normal University, China

Chapter 20
Application of the Cluster Analysis in Computational Paleography .................................. 525
Loránd Lehel Tóth, Budapest University of Technology and Economics, Hungary
Raymond Eliza Ivan Pardede, Budapest University of Technology and Economics, Hungary
György András Jeney, Budapest University of Technology and Economics, Hungary
Ferenc Kovács, Budapest University of Technology and Economics, Hungary
Gábor Hosszú, Budapest University of Technology and Economics, Hungary

Compilation of References .............................................................................................. 544

About the Contributors .................................................................................................. 605

Index ............................................................................................................................... 614