

B. Rushi Kumar · S. Ponnusamy ·
Debasis Giri · Bhavani Thuraisingham ·
Christopher W. Clifton ·
Barbara Carminati *Editors*

Mathematics and Computing

ICMC 2022, Vellore, India, January 6–8

Springer Proceedings in Mathematics & Statistics

Volume 415

This book series features volumes composed of selected contributions from workshops and conferences in all areas of current research in mathematics and statistics, including data science, operations research and optimization. In addition to an overall evaluation of the interest, scientific quality, and timeliness of each proposal at the hands of the publisher, individual contributions are all refereed to the high quality standards of leading journals in the field. Thus, this series provides the research community with well-edited, authoritative reports on developments in the most exciting areas of mathematical and statistical research today.

B. Rushi Kumar · S. Ponnusamy · Debasis Giri ·
Bhavani Thuraisingham · Christopher W. Clifton ·
Barbara Carminati
Editors

Mathematics and Computing

ICMC 2022, Vellore, India, January 6–8



Springer

Editors

B. Rushi Kumar
Department of Mathematics
School of Advanced Sciences
Vellore Institute of Technology
Vellore, Tamil Nadu, India

Debasis Giri
Department of Information Technology
Maulana Abul Kalam Azad University
of Technology
Haringhata, West Bengal, India

Christopher W. Clifton
Department of Computer Science
Purdue University
West Lafayette, IN, USA

S. Ponnusamy
Department of Mathematics
Indian Institute of Technology Madras
Chennai, Tamil Nadu, India

Bhavani Thuraisingham
Department of Computer Science
The University of Texas at Dallas
Richardson, TX, USA

Barbara Carminati
Department of Theoretical and Applied
Sciences
University of Insubria
Varese, Italy

ISSN 2194-1009 ISSN 2194-1017 (electronic)
Springer Proceedings in Mathematics & Statistics
ISBN 978-981-19-9306-0 ISBN 978-981-19-9307-7 (eBook)
<https://doi.org/10.1007/978-981-19-9307-7>

Mathematics Subject Classification: 97R20, 94C15, 90B50, 93C10, 94D05, 05C90, 12D05, 92E20

© The Editor(s) (if applicable) and The Author(s), under exclusive license to Springer Nature Singapore Pte Ltd. 2022

This work is subject to copyright. All rights are solely and exclusively licensed by the Publisher, whether the whole or part of the material is concerned, specifically the rights of translation, reprinting, reuse of illustrations, recitation, broadcasting, reproduction on microfilms or in any other physical way, and transmission or information storage and retrieval, electronic adaptation, computer software, or by similar or dissimilar methodology now known or hereafter developed.

The use of general descriptive names, registered names, trademarks, service marks, etc. in this publication does not imply, even in the absence of a specific statement, that such names are exempt from the relevant protective laws and regulations and therefore free for general use.

The publisher, the authors, and the editors are safe to assume that the advice and information in this book are believed to be true and accurate at the date of publication. Neither the publisher nor the authors or the editors give a warranty, expressed or implied, with respect to the material contained herein or for any errors or omissions that may have been made. The publisher remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

This Springer imprint is published by the registered company Springer Nature Singapore Pte Ltd.
The registered company address is: 152 Beach Road, #21-01/04 Gateway East, Singapore 189721,
Singapore

Contents

Computer Science

Color Multiscale Block-ZigZag LBP (CMB-ZZLBP): An Efficient and Discriminant Face Descriptor	3
Shekhar Karanwal	
Effect of Noise in the Quantum Network Implementation of Cop and Robber Game	15
Anjali Dhiman and S. Balakrishnan	
Study of Decoherence in Quantum Cournot Duopoly Game Using Modified EWL Scheme	27
A. V. S. Kameshwari and S. Balakrishnan	
A New Aggregation Operator for Single-Valued Triangular Neutrosophic Number in Decision-Making	37
G. Tamilarasi and S. Paulraj	
Redundancy of Codes with Graph Constraints	51
Ghurumuruhan Ganesan	
Tree Parity Machine-Based Symmetric Encryption: A Hybrid Approach	61
Ishak Meraouche, Sabyasachi Dutta, Haowen Tan, and Kouichi Sakurai	
Metadata Analysis of Web Images for Source Authentication in Online Social Media	75
Mohd Shaliyar and Khurram Mustafa	
A Computational Diffie–Hellman-Based Insider Secure Signcryption with Non-interactive Non-repudiation	89
Ngarenon Togde and Augustin P. Sarr	

<i>k</i>NN-SVM with Deep Features for COVID-19 Pneumonia	
Detection from Chest X-ray	103
Aman Bahuguna, Deepak Yadav, Apurbalal Senapati, and Baidya Nath Saha	
Quantum Simulation of Perfect State Transfer on Weighted Cubelike Graphs	117
Jaideep Mulherkar, Rishikant Rajdeepak, and Sunitha VadivelMurugan	
Quadratically Sound Proof-of-Sequential-Work	129
Souvik Sur and Dipanwita Roychowdhury	
On Some Properties of <i>K</i>-type Block Matrices in the Context of Complementarity Problem	143
A. Dutta and A. K. Das	
Families of Mordell Curves with Non-trivial Torsion and Rank of at Least Three	155
Renz Jimwel S. Mina and Jerico B. Bacani	
Applied Algebra and Analysis	
On the Genus of the Annihilator-Ideal Graph of Commutative Ring	165
Selvakumar Krishnan and Karthik Shunmugaiah	
The Radio <i>k</i>-chromatic Number for the Corona of Arbitrary Graph and K_1	175
P. K. Nirajan	
Some Parameters of Restricted Super Line Graphs	185
Latha Devi Puli and K. Manjula	
Edge Constrained Eulerian Extensions	195
Ghurumuruhan Ganesan	
Bounds of Some Energy-Like Invariants of Neighbourhood Corona of Graphs	205
Chinglensana Phanjoubam and Sainkupar Mn. Mawiong	
Linear Recurrent Fractal Interpolation Function for Data Set with Gaussian Noise	217
Mohit Kumar, Neelesh S. Upadhye, and A. K. B. Chand	
C^1-Rational Quadratic Trigonometric Spline Fractal Interpolation Functions	229
Vijay and A. K. B. Chand	
Cyclic Multivalued Iterated Function Systems	245
R. Pasupathi, A. K. B. Chand, and M. A. Navascués	

Contents	vii
On Almost Statistical Convergence of Weight r	257
Ekrem Savaş	
Non-neighbor Topological Indices on Covid-19 Drugs with QSPR Analysis	263
W. Tamilarasi and B. J. Balamurugan	
Some Results on Differential Polynomials of Meromorphic Functions Sharing Certain Values	279
M. Tejuswini and N. Shilpa	
A Subclass of Pseudo-Type Meromorphic Bi-Univalent Functions of Complex Order Associated with Linear Operator	293
Asha Thomas, Thomas Rosy, and G. Murugusundaramoorthy	
Bi-Starlike Function of Complex Order Involving Double Zeta Functions in Shell Shaped Region	305
V. Malathi and K. Vijaya	
Fuzzy Rule-Based Expert System for Multi Assets Portfolio Optimization	319
Garima Bisht and Sanjay Kumar	
Stability Analysis of Additive Time-Varying T-S Fuzzy System Using Augmented Lyapunov Functional	335
Bhuvaneshwari Ganesan and Manivannan Annamalai	
Fractional Calculus and Integral Equations	
Solution of Fractional Differential Equations by Using Conformable Fractional Differential Transform Method with Adomian Polynomials	349
R. S. Teppawar, R. N. Ingle, and R. A. Muneshwar	
Generalized Results on Existence & Uniqueness with Wronskian and Abel Formula for α-Fractional Differential Equations	363
R. A. Muneshwar, K. L. Bondar, V. D. Mathpati, and Y. H. Shirole	
Method of Directly Defining the Inverse Mapping for Nonlinear Ordinary and Partial Fractional-Order Differential Equations	379
Dulashini Karunaratna and Mangalagama Dewasurendra	
Existence Results for Nonlocal Impulsive Fractional Neutral Functional Integro Differential Equations with Bounded Delay	391
M. Latha Maheswari and R. Nandhini	
An Application of Conformable Fractional Differential Transform Method for Smoking Epidemic Model	399
G. Tamil Preethi, N. Magesh, and N. B. Gatti	

Solvability of Infinite System of Volterra Integral Equations in the Tempered Spaces	413
Rahul and N. K. Mahato	
On Generalizations of Integral Inequalities and Its Applications	425
S. G. Latpate and S. V. Babar	
Mathematical Modelling and Fluid Dynamics	
Solving Multi-objective Chance Constraint Quadratic Fractional Programming Problem	441
Berhanu Belay and Adane Abebew	
Higher Order Variational Symmetric Duality Over Cone Constraints	453
Sony Khatri and Ashish Kumar Prasad	
On Generalized Energy Inequality of the Damped Navier–Stokes Equations with Navier Slip Boundary Conditions	465
Subha Pal and Duranta Chutia	
The Diathermic Oils Over a Thin Liquid Film with MOS_2 Nano Particles: A Model with Analysis of Shape Factor Effects	479
S. Suneetha, K. Subbarayudu, and P. Bala Anki Reddy	
Wave Energy Dissipation by Multiple Permeable Barriers in Finite Depth Water	497
Biman Sarkar and Soumen De	
Thermal Stress Analysis of Inhomogeneous Infinite Solid to 2D Elasticity of Thermoelastic Problems	509
Abhijeet Adhe and Kirtiwant Ghadle	
Study of Non-Newtonian Models for 1D Blood Flow Through a Stenosed Carotid Artery	523
Mahesh Udupa and Sunanda Saha	
Two-Layered Flow of Ionized Gases Within a Channel of Parallel Permeable Plates Under an Applied Magnetic Field with the Hall Effect	541
M. Nagavalli, T. LingaRaju, and Peri K. Kameswaran	
Influence of Heat Transfer, Chemical Reaction and Variable Fluid Properties on Oscillatory MHD Couette Flow Through a Partially-Porous Channel	557
Sreedhara Rao Gunakala, Victor M. Job, and Jennilee Veronique	
Effect of Heat Transfer on Peristaltic Transport of Prandtl Fluid in an Inclined Porous Channel	573
Indira Ramarao, Priyanka N. Basavaraju, and Jagadeesha Seethappa	

A Multiscale Model of Stokes–Cahn–Hilliard Equations in a Porous Medium: Modeling, Analysis and Homogenization	591
Nitu Lakhmara and Hari Shankar Mahato	
Sensitivity and Directional Analysis of Two Mutually Competing Plant Population Under Allelopathy Using DDE	605
Dipesh and Pankaj Kumar	
Pore Scale Analysis and Homogenization of a Diffusion-Reaction-Dissolution-Precipitation Model	621
Nibedita Ghosh and Hari Shankar Mahato	
Mathematical Modeling and Computing to Study the Influence of Quarantine Levels and Common Mitigation Strategies on the Spread of COVID-19 on a Higher Education Campus	637
Raina Saha, Clarissa Benitez, Krista Cimbalista, Jolypich Pek, and Padmanabhan Seshaiyer	
 Numerical Analysis	
Numerical Solution of the Fredholm Integral Equations of the First Kind by Using Multi-projection Methods	655
Subhashree Patel, Bijaya Laxmi Panigrahi, and Gnaneshwar Nelakanti	
Local Convergence of a Family of Kurchatov Like Methods for Nonlinear Equations	669
Abhimanyu Kumar and Soni Kumari	
An Effective Scheme for Solving a Class of Second-Order Two-Point Boundary Value Problems	681
Saurabh Tomar, Soniya Dhama, and Kuppalapalle Vajravelu	
An Analytic Solution for the Helmholtz-Duffing Oscillator by Modified Mickens' Extended Iteration Procedure	689
M. M. Ayub Hossain and B. M. Ikramul Haque	
Crank-Nicolson Finite Difference Scheme for Time-Space Fractional Diffusion Equation	701
Kalyanrao C. Takale and Veena V. Sangvikar (Kshirsagar)	
Gauss-Newton-Secant Method for the Solution of Non-linear Least-Square Problems Using ω-Condition	711
Naveen Chandra Bhagat, P. K. Parida, Chandresh Prasad, Sapan Kumar Nayak, Babita Mehta, and P. K. Sahoo	