

Contents

Part I Mathematical Foundations

Existence of Solutions of Abstract Fractional Impulsive Integrodifferential Equations of Sobolev Type	3
Natarajan Annapoorani	
Quadrature Based Approximations of Non-integer Order Integrator on Finite Integration Interval.	11
Jerzy Baranowski	
On the Fractional Continuous-Time Hegselmann–Krause’s Type Consensus Model.	21
Ewa Girejko, Dorota Mozyrska and Małgorzata Wyrwas	
Harmonic Numbers of Any Order and the Wolstenholme’s-Type Relations for Harmonic Numbers	33
Edyta Hetmaniok, Piotr Lorenc, Mariusz Pleszczyński, Michał Różański, Marcin Szweda and Roman Wituła	
Cayley–Hamilton Theorem for Fractional Linear Systems	45
Tadeusz Kaczorek	
Order Composition Properties for Output-Additive Variable-Order Derivative	57
Michał Macias	
Variable-, Fractional-Order Oscillation Element	65
Dorota Mozyrska and Piotr Ostalczyk	
Variable-, Fractional-Order Inertial Element	77
Piotr Ostalczyk and Dorota Mozyrska	
Remarks on Mittag-Leffler Discrete Function and Putzer Algorithm for Fractional h-Difference Linear Equations	89
Ewa Pawłuszewicz	

On the Output-Additive Switching Strategy for a New Variable Type and Order Difference.	101
Dominik Sierociuk, Wiktor Malesza and Michał Macias	
Large Deviations for Stochastic Fractional Differential Equations	113
Murugan Suvinthra	
Mean Square Stability of Discrete-Time Fractional Order Systems With Multiplicative Noise.	123
Viorica Mariela Ungureanu and Mădălina Roxana Buneci	
Part II Modeling and Control	
Conformable Fractional Wave-Like Equation on a Radial Symmetric Plate.	137
Derya Avcı, Beyza Billur İskender Eroğlu and Necati Özdemir	
Reconstruction Robin Boundary Condition in the Heat Conduction Inverse Problem of Fractional Order	147
Rafał Brociek, Damian Słota and Adam Zielonka	
Linear and Nonlinear Fractional Voigt Models	157
Amar Chidouh, Assia Guezane-Lakoud, Rachid Bebbouchi, Amor Bouaricha and Delfim F.M. Torres	
Digital Fractional Integrator	169
Radosław Cioć	
Optimal Control for Discrete Fractional Systems.	175
Andrzej Dzieliński	
Fractional Order Back Stepping Sliding Mode Control for Blood Glucose Regulation in Type I Diabetes Patients	187
Hamid Heydarinejad and Hadi Delavari	
Maximum and Minimum Principles for the Generalized Fractional Diffusion Problem with a Scale Function-Dependent Derivative	203
Małgorzata Klimek and Kalina Kamińska	
On a New Class of Multistage Fractional-Order Phase-Lead Compensators	215
Guido Maione	
On the Existence of Optimal Controls for the Fractional Continuous-Time Cucker–Smale Model	227
Agnieszka B. Malinowska, Tatiana Odziejewicz and Ewa Schmeidel	

Determining the Time Elapsed Since Sudden Localized Impulse Given to Fractional Advection Diffusion Equation	241
Marie-Christine Néel	
Accuracy Analysis for Fractional Order Transfer Function Models with Delay	253
Krzysztof Oprzędkiewicz and Wojciech Mitkowski	
Accuracy Estimation of Digital Fractional Order PID Controller	265
Krzysztof Oprzędkiewicz	
Modeling of Fractional-Order Integrators and Differentiators Using Tustin-Based Approximations and Model Order Reduction Techniques	277
Marek Rydel, Rafał Stanisławski, Marcin Gałek and Krzysztof J. Latawiec	
Tempered Fractional Model of Transient Current in Organic Semiconductor Layers	287
Renat Sibatov and Ekaterina Morozova	
Modeling Heat Transfer Process in Grid-Holes Structure Changed in Time Using Fractional Variable Order Calculus	297
Piotr Sakrajda and Dominik Sierociuk	
Analysis of Performance Indicators for Tuning Non-integer Order Controllers	307
Marta Zagórska	
Part III Controllability and Stability	
Controllability of Nonlinear Fractional Delay Dynamical Systems with Multiple Delays in Control	321
Krishnan Balachandran	
New Controllability Criteria for Fractional Systems with Varying Delays	333
Jerzy Klamka and Beata Sikora	
Controllability of Nonlinear Stochastic Fractional Integrodifferential Systems in Hilbert Spaces	345
Rajendran Mabel Lizzy	
Finding a Set of (A, B, C, D) Realisations for Fractional One-Dimensional Systems with Digraph-Based Algorithm	357
Konrad Andrzej Markowski and Krzysztof Hryniów	
Relative Controllability of Nonlinear Fractional Delay Dynamical Systems with Time Varying Delay in Control	369
Joice Nirmala Rajagopal	

Stability Analysis for the New Model of Fractional Discrete-Time Linear State-Space Systems	381
Andrzej Ruszewski	
Fractional Differential-Algebraic Systems with Delay: Computation of Final Dimension Initial Conditions and Inputs for Given Outputs	391
Zbigniew Zaczekiewicz	
Part IV Applications	
Robot Path Control with Al-Alaoui Rule for Fractional Calculus Discretization	405
Artur Babiarczyk, Adrian Łęgowski and Michał Niezabitowski	
Implementation of Bi-fractional Filtering on the Arduino Uno Hardware Platform	419
Waldemar Bauer and Aleksandra Kawala-Janik	
Fractional Prabhakar Derivative and Applications in Anomalous Dielectrics: A Numerical Approach	429
Roberto Garrappa and Guido Maione	
Finite Element Method for Time Fractional Keller–Segel Chemotaxis System	441
Arumugam Gurusamy	
Adaptive Fractional Order Sliding Mode Controller Design for Blood Glucose Regulation-4-3	449
Hamid Heydarinejad and Hadi Delavari	
Expansion of Digraph Size of 1-D Fractional System with Delay	467
Konrad Andrzej Markowski and Krzysztof Hryniów	
A Discrete-Time Fractional Order PI Controller for a Three Phase Synchronous Motor Using an Optimal Loop Shaping Approach	477
Paolo Mercorelli	
Application of SubIval, a Method for Fractional-Order Derivative Computations in IVPs	489
Marcin Sowa	
Application of the Time-Fractional Diffusion Equation to Methyl Alcohol Mass Transfer in Silica	501
Alexey A. Zhokh, Andrey A. Trypolskyi and Peter E. Strizhak	
Author Index	511

Theory and Applications of Non-integer Order Systems
8th Conference on Non-integer Order Calculus and Its
Applications, Zakopane, Poland

Babiarz, A.; Czornik, A.; Klamka, J.; Niezabitowski, M.
(Eds.)

2017, XII, 512 p. 141 illus., 99 illus. in color., Hardcover
ISBN: 978-3-319-45473-3