

12th IFAC Conference on Fractional Differentiation and its Applications (ICFDA 2024)

IFAC PapersOnline Volume 58, Issue 12

Bordeaux, France
9-12 July 2024

Editor:

S. Victor

ISBN: 979-8-3313-0242-9

Printed from e-media with permission by:

Curran Associates, Inc.
57 Morehouse Lane
Red Hook, NY 12571



Some format issues inherent in the e-media version may also appear in this print version.

To the extent permissible under applicable laws, no responsibility is assumed by the Owner, the Publisher or the Licensee for any injury and/or damage to persons or property as a result of any actual or alleged libelous statements, infringement of intellectual property or privacy rights, or products liability, whether resulting from negligence or otherwise, or from any use or operation of any ideas, instructions, procedures, products or methods contained in the material therein.

The publication of an advertisement in the POD Edition does not constitute on the part of the Owner, the Publisher or the Licensee a guarantee or endorsement of the quality or value of the advertised products or services described therein or of any of the representations or the claims made by the advertisers with respect to such products or services.

Copyright© (2024) by the authors
Open access publication under the CC-BY-NC-ND License
<https://creativecommons.org/licenses/by-nc-nd/4.0/>
All rights reserved.

Printed with permission by Curran Associates, Inc. (2025)

For permission requests, please contact the publisher, Elsevier Limited
at the address below.

Elsevier Limited
The Boulevard, Langford Lane
Kidlington
Oxford OX5 1GB UK

Additional copies of this publication are available from:

Curran Associates, Inc.
57 Morehouse Lane
Red Hook, NY 12571 USA
Phone: 845-758-0400
Fax: 845-758-2633
Email: curran@proceedings.com
Web: www.proceedings.com

TABLE OF CONTENTS

Control Problems with Fractional Derivatives and Nonlinearities	1
<i>Maja Jolic, Sanja Konjik, Darko Mitrovic</i>	
Analog Realization and Numerical Evaluation of the Variable Fractional-Order Integrator $I^{\alpha(t)}$	7
<i>Abdelfatah Charef, Samir Ladaci</i>	
Recursive System Identification for Havriliak-Negami Functions by Using Modified LMRPEM Method	13
<i>Jean-François Duhé, Stéphane Victor, Pierre Melchior</i>	
Bio-Heat Transfer Modeling in Lungs.....	19
<i>Enso Ndreko, Stéphane Victor, Pierre Melchior</i>	
Automatic Initialization and Model Selection for Li-Ion Battery Impedance Identification in the Frequency Domain	25
<i>Omar Arahbi, Benoît Huard, Jean-Denis Gabano, Thierry Poinot</i>	
Algebraic Disturbance Estimation for a Class of Fractional Order T-S Fuzzy Systems with Noisy Output Measurements.....	31
<i>Yan-Qiao Wei, Da-Yan Liu, Chang-Chun Hua, Xue-Feng Zhang</i>	
Fractional Adaptive Observer for Variable Structure High Cell Density Fed-Batch Cultures.....	37
<i>Lisbel Bárzaga-Martell, Norelys Aguila-Camacho, Francisco Ibáñez-Espinel, Manuel Duarte-Mermoud, José Ricardo Pérez-Correa</i>	
Variable-Order Model of Cardiac Fibrillation.....	43
<i>Juan P. Ugarte, Catalina Tobón</i>	
A New COVID 19 Model Using Fractional Calculus: Stability, Mitigate Pandemic and Simulations	49
<i>Noureddine Djenina, Giuseppe Grassi, Adel Ouannas, Zohir Dibi</i>	
A Compact Fractional-Order Model for Hypnosis in General Anesthesia	55
<i>Marcian Mihai, Isabela Birs, Hegedus Erwin, Dana Copot, Martine Neckebroek</i>	
A Fractional Order Impedance Model for Heterogeneous Drug Distribution in Obese Patients During General Anesthesia	61
<i>Amani R. Ynineb, Erhan Yumuk, Hamed Farbakhsh, Ghada Ben Othman, Martine Neckebroek</i>	
The Multi-Index Mittag-Leffler-Le Roy Functions as I- and H^- -Functions and New Fractional Calculus Operators	67
<i>Virginia Kiryakova, Jordanka Paneva-Konovska</i>	
A Numerical Scheme for Time-Space Fractional Diffusion Models	73
<i>Tahani Aldhaban, Khaled M. Furati</i>	
Exact $A(\alpha)$ -Stability Angles for Fractional Linear Multi-step Methods	78
<i>Haniffa M. Nasir, Khadija Al-Hasani</i>	
Central Discontinuous Galerkin Finite Element Method for the Time-Fractional Convection Equation in Two Space Dimensions	83
<i>Dongxia Li</i>	

Numerical Approximation of Spatially Loaded Time-Fractional Diffusion Equation.....	89
<i>Shweta Kumari, Mani Mehra</i>	
Fractional Order MRAC Control Design for a Lightning System Based on a Fractional Order Second Degree Model	95
<i>Samir Ladaci, Seif Eddine Khelas, Amani R Ynineb, Dana Copot, Clara-Mihaela Ionescu</i>	
Control of Fractional Order Bergman's Glucose-Insulin Minimal Model.....	101
<i>R. Caponetto, S. Graziani, I. Shafeeq Mughal, L. Patanè, F. Sapuppo</i>	
Fractional-Order Control to Prevent Limit Cycles Due to Saturation Nonlinearity	107
<i>Guido Maione</i>	
New Continuous Dynamic Fractional Repulsive Potential Field for Path Planning.....	113
<i>Albert Robinet, Stéphane Victor, Pierre Melchior</i>	
On PID Controllers for a Complex-Order Fractional Model of an Automotive Injection System	119
<i>A. Altamura, P. Lino, G. Maione, M. Kapetina, Z. D. Jelcic</i>	
Performance Comparison Between PID, PIDD2 and PIDD2 α	125
<i>Marco Milanese, Antonio Visioli, Yangquan Chen</i>	
Periodic Points, Stability, Bifurcations, and Transition to Chaos in Generalized Fractional Maps	131
<i>Mark Edelman</i>	
On Complex Orders in Fractional Calculus: Floors, Ceilings, and Analytic Continuation	143
<i>Arran Fernandez</i>	
General Transmutation Relations and Their Applications	149
<i>Arran Fernandez, Hafiz Muhammad Fahad</i>	
Analytical Study to Systems of Fractional Differential Equations with Prabhakar Derivative	155
<i>Tariq E. Namarneh, Mohammed Al-Refai</i>	
Review of Local Fractional Differential Equations	161
<i>Kiran M. Kolwankar</i>	
Exponential Time Differencing Scheme for Fractional Plasma Oscillations.....	169
<i>Aljowhara H. Honain, Khaled M. Furati</i>	
A Fast Finite Difference Scheme for the Time-Space Fractional Diffusion Equation	174
<i>Y. Wang, M. Cai</i>	
Application of Fractional-Order PID Controllers in a Greenhouse Climate Control System.....	179
<i>Emmanuel B. Edet, Mercedes Chacón-Vásquez, Emmanuel C. Onyeocha</i>	
A Finite Memory Approach Applied to Verified Pseudo State Estimation of Fractional Models of Lithium-Ion Batteries	185
<i>Andreas Rauh, Marit Lahme</i>	
Analytical Fractional Reduced-Order Model Identification Method for Processes with Overdamped and Underdamped Response	191
<i>Juan J. Gude, Flavia B. Baraldi, Ibon Oleagordia, Pablo García Bringas</i>	
Modulating Functions Based State Estimator for Caputo Fractional Systems	197
<i>Da-Yan Liu, Xing Wei, Yan-Qiao Wei, Driss Boutat, Hao-Ran Liu</i>	

Fractional-Order Non-ideal Isolation Transformer Modeling and Parameter Estimation for Flyback Power Converters	203
<i>Justus Nwoke, Jairo Viola, Yangquan Chen</i>	
Comparison of 2D Thermal Diffusion Approximations with Experimental Data	209
<i>Lucas Furlan Rufino Da Silva, Stéphane Victor, Andrzej Kusiak, Jean-Luc Battaglia</i>	
Fractional Calculus, Riemann Zeta Function and Euler Products	215
<i>E. Guariglia</i>	
Mikusiński's Operational Calculus for Fractional Operators with Different Kernels.....	220
<i>Arran Fernandez, Noosheza Rani</i>	
On a Linear Fractional Differential Equation Involving Liouville Derivative	226
<i>Ivan Matychyn, Viktoriia Onyshchenko</i>	
Stability Properties of Multi-Order Fractional Differential Systems in 3D.....	231
<i>Kai Diethelm, Safoura Hashemishahraki, Ha Duc Thai, Hoang The Tuan</i>	
Boundary Disturbance Rejection Control for Fractional-Order Multi-agent Systems with Reaction-diffusion.....	237
<i>Wei Chen, Guojian Ren, Yongguang Yu</i>	
Reset Control Performance Improvement Using Fractional Derivatives	243
<i>Duarte Valério, Niranjana Saikumar, Ali Ahmadi Dastjerdi, Nima Karbasizadeh, S. Hassan Hosseinnia</i>	
Synchronization of Multi-Term Fractional-Order Neural Networks with Switching Parameters Via Hybrid Impulsive Control.....	249
<i>Dongsheng Yang, Hu Wang, Xiaoli Zhang, Yongguang Yu</i>	
Realization of FOI and FOD of Complex Orders.....	254
<i>Reyad El-Khazali</i>	
Fractional Order for Multi-Criteria Control Performance Assessment.....	259
<i>Pawel D. Domanski</i>	
The Infinite State Representation of Fractional Order Differential Systems: A Survey - Part 1.....	265
<i>J. C. Trigeassou, N. Maamri</i>	
The Infinite State Representation of Fractional Order Differential Systems: A Survey - Part 2.....	276
<i>J. C. Trigeassou, N. Maamri</i>	
Ulam-Hyers and Generalized Ulam-Hyers Stability of Fractional Functional Integro-differential Equations.....	280
<i>Natalia Dilna, Martina Langerová</i>	
Stability Results for Nonlinear Fractional Differential Equations with Incommensurate Orders.....	286
<i>Shaher Momani, Noureddine Djenina, Adel Ouannas, Iqbal M. Batiha</i>	
Differential Equations with Variable Order Generalized Proportional Caputo Fractional with Respect to Another Function: Existence and Stability.....	291
<i>Snezhana Hristova</i>	
Uniqueness and Existence for a Fractional Differential Equation with Functional Boundary Condition.....	296
<i>Chenkuan Li</i>	

General Fractional Calculus Operators with the Sonin Kernels and Some of Their Applications.....	302
<i>Yuri Luchko</i>	
An Easy-To-Use Tool to Solve Differential Equations with the Fractional Laplacian	312
<i>Fabio V. Difonzo, Roberto Garrappa</i>	
Runge–Kutta Type Time Stepping Methods for Space Fractional Reaction Diffusion Model with Restricted Padé Approximation	318
<i>Shahzad Sarwar, Muhammad Yousuf</i>	
Fault-Tolerant Control and Diagnosis for Trajectory Tracking in a Class of Nonlinear Fractional Order Systems	324
<i>Lorenz Josue Oliva-Gonzalez, Rafael Martínez-Guerra</i>	
On the Implementation of Gain Scheduling in FOPID Controllers.....	330
<i>Marco Milanese, Fabrizio Padula, Antonio Visioli</i>	
Stability Analysis of Distributed-Order Systems.....	336
<i>Milan R. Rapaic, Rachid Malti, Vukan Turkulov, Zoran D. Jelcic, Tomislav B. Šekara</i>	
Fractional-Order VRFT Reference Model and Controller Synthesis for Uniformity Temperature Control Applications.....	341
<i>Juan Gabriel Araque, Luis Angel, Jairo Viola, Yangquan Chen</i>	
Discrete Second Order Sliding Mode Control for Fractional Order Hammerstein System.....	347
<i>Aicha Znidi, Rim Jalouli Khelif, Ahmed Said Nouri, Nabil Derbel</i>	
Analog Real Time Tunable and Configurable Fractional Order PID Controller Realization	353
<i>W. Ounis, M. Chetoui, S. Najar, M. Aoun</i>	
Parameter Estimation on Polymer Solutions with Fractional Viscoelastic Model.....	359
<i>Xiaoping Wang, Haitao Qi, Huanying Xu, Xin Wang, Yanli Qiao</i>	
A Non-Local Wave Equation with General Fractional Derivatives and Time Delay.....	364
<i>Teodor M. Atanackovic</i>	
Fractional Mathieu Differential Equations in Dynamic Stability of Piles	368
<i>Mohammadmehdi Shahroudi, Yanglin Gong, Jian Deng</i>	
Aging and Confinement in Subordinated Fractional Brownian Motion.....	374
<i>Yingjie Liang, Wei Wang, Ralf Metzler</i>	
Fractional Particle Dynamics in Harmonic Flows at Finite Reynolds Numbers	380
<i>Omar Alali, Carlos F. M. Coimbra</i>	
Flow and Convection Heat of Spatial Fractional Derivative non-Newtonian Fluids in Fractal Main Channels	386
<i>Yuehua Jiang, Hongguang Sun</i>	
Numerical Approximation of the Space-Time Fractional Diffusion Problem	390
<i>Enza Pellegrino, Francesca Pitolli, Chiara Sargentone</i>	
Discrete-Time Fractional Variable Order Duffing Oscillator	395
<i>Dorota Mozyrska, Eva Kaslik, Malgorzata Wyrwas, Piotr Oziabło</i>	
On a Hilfer Generalized Proportional Fractional Integro-Differential Inclusion.....	401
<i>Aurelian Cernea</i>	

Positive Solutions of the Discrete Fractional Oscillation Equation.....	406
<i>Sangeeta Dhawan, Jagan Mohan Jonnalagadda</i>	
Novel Variants of Diffusive Representation of Fractional Integrals: Construction and Numerical Computation.....	412
<i>Renu Chaudhary, Kai Diethelm</i>	
Revisiting Diffusive Representations for Enhanced Numerical Approximation of Fractional Integrals.....	418
<i>Renu Chaudhary, Kai Diethelm</i>	
Comparison Between CRONE and H_∞ Control Approaches Applied to Tracking Antennas	424
<i>Rodrigo Negri De Azeredo, Mohamed Hajjem, Lara Thomas, Stéphane Victor, Pierre Melchior</i>	
Road Profile Estimation Based on the Second Generation CRONE Control	430
<i>Maroun El Kattar, Xavier Moreau, Ramon Guridis, Roy Abi Zeid Daou, Vincent Hernette</i>	
Tire Modeling for an Autonomous Tractor Suitable for Soft Soils.....	436
<i>Stéphane Victor, Albert Robinet, Youcef Ferradji, Pierre Melchior, Hugo Gimbert</i>	
Dynamic Modeling of a Fluidic Soft Actuator: First Results Within a Fractional Approach	442
<i>Andrés J. Serrano-Balbontín, Inés Tejado, Blas M. Vinagre</i>	
Fractional-Order Model of the Dynamics of a Flexible Sensing Antenna for Haptic Underwater Applications.....	448
<i>María Isabel Haro-Olmo, Selma Benfima, Antonio Camposeo, Vicente Feliu-Batlle</i>	
Hybrid State of Charge Estimator for a Lithium-Ion Battery Based on a Fractional Model and Fuzzy Logic	454
<i>Abderrahmane Adel, Rachid Malti, Olivier Briat</i>	
Generalized CRONE Sky Hook Suspension	460
<i>Fouad Farah, Xavier Moreau, Roy Abi Zeid Daou</i>	
Fractional Order Euler-Lagrange Model for Accelerated Gradient Methods	466
<i>Osama F. Abdel Aal, Jairo Viola, Yangquan Chen</i>	
The Variational Physics-Informed Neural Networks for Time-fractional Nonlinear Conservation Laws	472
<i>Changpin Li, Dongxia Li</i>	
Fractional Order Modeling of Lithium-Ion Batteries for a Real Smart Grid System	478
<i>Saddam Gharab, Asma Achnib, Patrick Lanusse, Vicente Feliu Batlle</i>	
Positive Solutions of a Nonlinear Three-Point p-Laplacian Fractional Boundary Value Problem with Infinitely Many Singularities.....	484
<i>S. Panigrahi, Raghvendra Kumar</i>	
Will Fractional Order Model Based MPC Save Control Energy?	490
<i>Shiang Cao, Yangquan Chen</i>	
Characterization of the Infinite State Representation of the Fractional Order Chaotic Lü System	496
<i>N. Maamri, J. C. Trigeassou</i>	

Separable Solutions of the Black-Scholes Equation with Three Different Time Fractional-order Derivatives.....	502
<i>P. Prakash, K. S. Priyendhu</i>	
Fractional Model of a Fractor.....	508
<i>Gary W. Bohannon, Duarte Valério, Manuel D. Ortigueira</i>	
Faster than FFT: Conformal Accelerations Method	513
<i>Svetlana Boyarchenko, Sergei Levendorskii</i>	
Adaptive Fixed-Time Proximal Gradient Method for Non-smooth Optimization: The Fractional Approach	525
<i>Yuquan Chen, Zhenlong Wu, Bing Wang, Yong Wang</i>	
Fractional-Order Super-Resolution Reconstruction Algorithm for GM-APD Lidar Distance Images Based on Convex Set Projection	531
<i>Jinqiu Li, Chunyang Wang, Xuelian Liu, Da Xie, Xuyang Wei</i>	
Fractional and B-COSFIRE Filter Based Approach for Efficient Segmentation of Retinal Blood Vessels	537
<i>Varun Makkar, Arya Tewary, Lakshya V. S. Rathore, Rajesh K. Pandey</i>	

Author Index