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Euler-Maruyama scheme for Caputo stochastic fractional differential equations
By: Doan, T. S.; Huong, P. T.; Kloeden, P. E.; etc..
JOURNAL OF COMPUTATIONAL AND APPLIED MATHEMATICS Volume: 380 Published: DEC 15 2020

Shifted Jacobi spectral-Galerkin method for solving fractional order initial value problems
By: Kim, Hyunju; Kim, Keon Ho; Jang, Bongsoo
JOURNAL OF COMPUTATIONAL AND APPLIED MATHEMATICS Volume: 380 Published: DEC 15 2020

Multistep schemes for one and two dimensional electromagnetic wave models based on fractional derivative approximation
By: Maurya, Rahul Kumar; Devi, Vinita; Singh, Vineet Kumar
JOURNAL OF COMPUTATIONAL AND APPLIED MATHEMATICS Volume: 380 Published: DEC 15 2020

Fourth order compact scheme for space fractional advection-diffusion reaction equations with variable coefficients
By: Patel, Kuldip Singh; Mehra, Mani
JOURNAL OF COMPUTATIONAL AND APPLIED MATHEMATICS Volume: 380 Published: DEC 15 2020

The fractional Tikhonov regularization methods for identifying the initial value problem for a time-fractional diffusion equation
By: Yang, Fan; Pu, Qu; Li, Xiao-Xiao
JOURNAL OF COMPUTATIONAL AND APPLIED MATHEMATICS Volume: 380 Published: DEC 15 2020

Can fractional calculus help improve tumor growth models?
By: Valentim Jr, Carlos A.; Oliveira, Naila A.; Rabi, Jose A.; etc..
JOURNAL OF COMPUTATIONAL AND APPLIED MATHEMATICS Volume: 379 Published: DEC 1 2020

Modified Sliding-Mode Control Method for Synchronization a Class of Chaotic Fractional-Order

Systems with Application in Encryption
By: Naderi, Bashir; Kheiri, Hossein; Vafaei, Vajiheh
ISECURE-ISC INTERNATIONAL JOURNAL OF INFORMATION SECURITY Volume: 12 Issue: 1 Pages: 55-66 Published: WIN-SPR 2020

Neumann method for solving conformable fractional Volterra integral equations
By: Ilie, Mousa; Biazar, Jafar; Ayati, Zainab
COMPUTATIONAL METHODS FOR DIFFERENTIAL EQUATIONS Volume: 8 Issue: 1 Pages: 54-68 Published: WIN 2020

Legendre-collocation spectral solver for variable-order fractional functional differential equations
By: Hafez, Ramy Mahmoud; Youssri, Youssri Hassan
COMPUTATIONAL METHODS FOR DIFFERENTIAL EQUATIONS Volume: 8 Issue: 1 Pages: 99-110 Published: WIN 2020

Approximate nonclassical symmetries for the time-fractional KdV equations with the small parameter
By: Najafi, Ramin
COMPUTATIONAL METHODS FOR DIFFERENTIAL EQUATIONS Volume: 8 Issue: 1 Pages: 111-118 Published: WIN 2020

Impulsive initial value problems for a class of implicit fractional differential equations
By: Shaikh, Amjad Salim; Sontakke, Bhausaheb R.
COMPUTATIONAL METHODS FOR DIFFERENTIAL EQUATIONS Volume: 8 Issue: 1 Pages: 141-154 Published: WIN 2020

A Study on Functional Fractional Integro-Differential Equations of Hammerstein type
By: Saeedi, Leila; Tari, Abolfazl; Babolian, Esmail
COMPUTATIONAL METHODS FOR DIFFERENTIAL EQUATIONS Volume: 8 Issue: 1 Pages: 173-193 Published: WIN 2020

The solving integro-differential equations of fractional order with the ultraspherical functions
By: Panahi, Saeid; Khani, Ali
COMPUTATIONAL METHODS FOR DIFFERENTIAL EQUATIONS Volume: 8 Issue: 1 Pages: 205-211 Published: WIN 2020

Algorithm for solving the Cauchy problem for stationary systems of fractional order linear ordinary differential equations
By: Aliev, Fikrat Ahmadali; Aliev, Nihan; Safarova, Nargis; etc..
COMPUTATIONAL METHODS FOR DIFFERENTIAL EQUATIONS Volume: 8 Issue: 1 Pages: 212-221 Published: WIN 2020

Simultaneous identification of three parameters in a time -fractional diffusion -wave equation by a part of boundary Cauchy data
By: Xian, Jun; Yan, Xiong-bin; Wei, Ting
APPLIED MATHEMATICS AND COMPUTATION Volume: 384 Published: NOV 1 2020

Solving fractional pantograph delay equations by an effective computational method
By: Hashemi, M. S.; Atangana, A.; Hajikhah, S.

MATHEMATICS AND COMPUTERS IN SIMULATION Volume: 177 Pages: 295-305 Published: NOV 2020

Finite Element Approximation of Space Fractional Optimal Control Problem with Integral State Constraint
By: Zhou, Zhaojie; Song, Jiabin; Chen, Yanping
NUMERICAL MATHEMATICS-THEORY METHODS AND APPLICATIONS Volume: 13 Issue: 4 Pages: 1027-1049 Published: NOV 2020

Mean square convergent numerical solutions of random fractional differential equations: Approximations of moments and density
By: Burgos, C.; Cortes, J-C; Villafuerte, L.; etc..
JOURNAL OF COMPUTATIONAL AND APPLIED MATHEMATICS Volume: 378 Published: NOV 2020

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Call for Papers

Fractional Calculus and the Future of Science

(Special Issue in Entropy)

Three centuries ago, Newton transformed Natural Philosophy into today's Science by focusing on change and quantification, and he did so in a way that resonated with the scientific community of his day. His arguments appeared to be geometric in character, and nowhere in the Principia do you find explicit reference to fluxions or to differentials. What Newton did was reveal the entailments of the calculus and convince generations of scientists of the value of their focusing on how physical objects change in space and time. Some contemporary mathematicians of his generation recognized what he had done, but their number could be counted on one hand, and their comments are primarily of historical interest only.
Fast-forward to today and Modern Science, from Anatomy to Zoology, is seen to have absorbed the transformational effect of Newton's contribution to how we quantitatively and qualitatively understand the world, the fundamental importance of motion. However, it has occurred to a number of the more philosophically attuned contemporary scientists that we are now at another point of transition, where the implications of complexity, memory, and uncertainty have revealed themselves to be barriers to our future understanding of our technological society.

Topics (not limited to):

We are looking for imaginative articles that implement FC and reveal its transformational nature, including but not limited to such things as: how a fractional derivative in time incorporates memory into the solution of the dynamic description of an earthquake, a brain quake or a crash in the stock market; how the fractional derivative in space incorporates spatial nonlocality into the solution of the complex dynamical descriptions of a riot, the collective intelligence of social groups, or the neuronal activity of the brain; or how the combined fractional derivatives in both time and space of measures of uncertainty incorporate both memory and nonlocality into the phase space solution to capture the limited uncertainty of an ensemble of fractal trajectories, or the scaling behavior of complex dynamical networks.
In short, we are seeking submissions in which the authors look behind the mathematics and examine what must be true about the phenomenon in order to justify the replacement of an ordinary derivative with a fractional derivative before they solve the new equations. For example, an insightful and extended explanatory description as to why one ought to expect the flow equations for honey and water to be different followed with a comparison of the solutions to the ordinary and fractional equations with data would constitute a paradigm for a submission. The desired articles are intended to provide the reader with a window into the future of a specific piece of science through the lens of FC and how that lens will make you think differently about that area of science. Thus, a perfect submission will be more about the intellectual implications and utility of the FC than it is about its formal structure in chemistry, epidemiology, sociology, psychology, physics, or any other scientific discipline.

Manuscript Submission Information:

Deadline for manuscript submissions: 15 December 2020.

All details on this special section are now available at:
https://www.mdpi.com/journal/entropy/special_issues/fract_future#info.

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Books

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New Digital Signal Processing Methods: Applications to Measurement and Diagnostics

(Authors: Raoul R. NigmatullinPaolo LinoGuido Maione)

Details:https://doi.org/10.1007/978-3-030-45359-6

Introduction

This book is intended as a manual on modern advanced statistical methods for signal processing. The

objectives of signal processing are the analysis, synthesis, and modification of signals measured from different natural phenomena, including engineering applications as well. Often the measured signals are affected by noise, distortion and incompleteness, and this makes it difficult to extract significant signal information. The main topic of the book is the extraction of significant information from measured data, with the aim of reducing the data size while keeping the basic information/knowledge about the peculiarities and properties of the analyzed system; to this aim, advanced and recently developed methods in signal analysis and treatment are introduced and described in depth. More in details, the book covers the following new advanced topics (and the corresponding algorithms), including detailed descriptions and discussions: the Eigen-Coordinates (ECs) method, The statistics of the fractional moments, The quantitative "universal" label (QUL) and the universal distribution function for the relative fluctuations (UDFRF), the generalized Prony spectrum, the Non-orthogonal Amplitude Frequency Analysis of the Smoothed Signals (NAFASS), the discrete geometrical invariants (DGI) serving as the common platform for quantitative comparison of different random functions. Although advanced topics are discussed in signal analysis, each subject is introduced gradually, with the use of only the necessary mathematics, and avoiding unnecessary abstractions. Each chapter presents testing and verification examples on real data for each proposed method. In comparison with other books, here it is adopted a more practical approach with numerous real case studies.

Keywords:

Signal analysis; Data fitting; Optimal linear smoothing; Eigen-Coordinates; Reduced fractal models; Nonparametric methods; Statistics of fractional moments; Quantitative universal label; Fractal object; Generalized Prony spectrum; Self-similar properties; Quasi-periodic measurement; Quasi-reproducible experiments

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Xiaohong Wang, Huaiqin Wu, Jinde Cao

Lyapunov and external stability of Caputo fractional order switching systems
Cong Wu, Xinzhi Liu

Dynamic cobweb models with conformable fractional derivatives
Martin Bohner, Veysel Fuat Hatipoğlu

Mode-dependent non-fragile observer-based controller design for fractional-order T–S fuzzy systems with Markovian jump via non-PDC scheme
Ruirui Duan, Junmin Li, Jiaxi Chen

Observer-based robust control for fractional-order nonlinear uncertain systems with input saturation and measurement quantization
Yushun Tan, Menghui Xiong, Dongsheng Du, Shumin Fei

Solutions of systems with the Caputo–Fabrizio fractional delta derivative on time scales
Dorota Mozyrska, Delfim F. M. Torres, Małgorzata Wyrwas

Stochastic averaging for two-time-scale stochastic partial differential equations with fractional Brownian motion
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Robust non-fragile H∞ fault detection filter design for delayed singular Markovian jump systems with linear fractional parametric uncertainties
Guobao Liu, Ju H. Park, Shengyuan Xu, Guangming Zhuang

Stability, control and observation on non-uniform time domain
Mohamed Djemai, Michael Defoort, Anatoly A. Martynyuk

A novel approach to generate attractors with a high number of scrolls
J. L. Echenausía-Monroy, G. Huerta-Cuellar

Almost always observable hybrid systems
Claudio Arbib, Elena De Santis

Leader-following consensus for networks with single- and double-integrator dynamics
Ewa Girejko, Agnieszka B. Malinowska

Stability analysis and output-feedback synthesis of hybrid systems affected by piecewise constant

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Ajith Kuriakose Mani, M. D. Narayanan

Fractional nonlinear dynamics of learning with memory
Vasily E. Tarasov

An experimental synthesis methodology of fractional-order chaotic attractors
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Short memory fractional differential equations for new memristor and neural network design
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Paper Highlight

A fractional-order model for the novel coronavirus (COVID-19) outbreak

Karthikeyan Rajagopal, Navid Hasanzadeh, Fatemeh Parastesh, Ibrahim Ismael Hamarash, Sajad Jafari, Iqtadar Hussain

Publication information: Nonlinear Dynamics, Published 24 June 2020

https://doi.org/10.1007/s11071-020-05757-6

Abstract

The outbreak of the novel coronavirus (COVID-19), which was firstly reported in China, has affected many countries worldwide. To understand and predict the transmission dynamics of this disease, mathematical models can be very effective. It has been shown that the fractional order is related to the memory effects, which seems to be more effective for modeling the epidemic diseases. Motivated by this, in this paper, we propose fractional-order susceptible individuals, asymptomatic infected, symptomatic infected, recovered, and deceased (SEIRD) model for the spread of COVID-19. We consider both classical and fractional-order models and estimate the parameters by using the real data of Italy, reported by the World Health Organization. The results show that the fractional-order model has less root-mean-square error than the classical one. Finally, the prediction ability of both of the integer- and fractional-order models is evaluated by using a test data set. The results show that the fractional model provides a closer forecast to the real data.

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Fractional Langevin Equation Involving Two Fractional Orders: Existence and Uniqueness Revisited

Hossein Fazli, HongGuang Sun, Juan J. Nieto

Publication information: Mathematics, Volume 8, Issue5, Published 2020
https://doi.org/10.3390/math8050743

Abstract

We consider the nonlinear fractional Langevin equation involving two fractional orders with initial conditions. Using some basic properties of Prabhakar integral operator, we find an equivalent Volterra integral equation with two parameter Mittag–Leffler function in the kernel to the mentioned equation. We used the contraction mapping theorem and Weissinger's fixed point theorem to obtain existence and uniqueness of global solution in the spaces of Lebesgue integrable functions. The new representation formula of the general solution helps us to find the fixed point problem associated with the fractional Langevin equation which its contractivity constant is independent of the friction coefficient. Two examples are discussed to illustrate the feasibility of the main theorems.

Keywords:

fractional Langevin equation; Mittag–Leffler function; Prabhakar integral operator; existence; uniqueness

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