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Latest SCI Journal Papers on FDA

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(Searched on Dec 30, 2020)

On a final value problem for a nonlinear fractional pseudo-parabolic equation
By: Vo Van Au; Jafari, Hossein; Hammouch, Zakia; etc.
ELECTRONIC RESEARCH ARCHIVE Volume: 29 Issue: 1 Pages: 1709-1734 Published: MAR 2021

Memory and media coverage effect on an HIV/AIDS epidemic model with treatment
By: Salman, Sanaa Moussa
JOURNAL OF COMPUTATIONAL AND APPLIED MATHEMATICS Volume: 385 Published: MAR 15 2021

Combined effects of logarithmic and superlinear nonlinearities in fractional Laplacian systems
By: Wang, Fuliang; Die, Hu; Xiang, Mingqi
ANALYSIS AND MATHEMATICAL PHYSICS Volume: 11 Issue: 1 Published: MAR 2021

Positive energy representations of Sobolev diffeomorphism groups of the circle
By: Carpi, Sebastiano; Del Vecchio, Simone; Iovieno, Stefano; etc.
ANALYSIS AND MATHEMATICAL PHYSICS Volume: 11 Issue: 1 Published: MAR 2021

Numerical solution of two-dimensional fractional-order reaction advection sub-diffusion equation with finite-difference Fibonacci collocation method
By: Dwivedi, Kushal Dhar; Singh, Jagdev
MATHEMATICS AND COMPUTERS IN SIMULATION Volume: 181 Pages: 38-50 Published: MAR 2021

TT-M FE method for a 2D nonlinear time distributed-order and space fractional diffusion equation
By: Gao, Xinghua; Yin, Baoli; Li, Hong; etc.
MATHEMATICS AND COMPUTERS IN SIMULATION Volume: 181 Pages: 117-137 Published: MAR 2021

COVID-19 pandemic and chaos theory
By: Postavaru, O.; Anton, S. R.; Toma, A.
MATHEMATICS AND COMPUTERS IN SIMULATION Volume: 181 Pages: 138-149 Published: MAR 2021

Analysis and numerical simulation of fractional Biswas-Milovic model
By: Prakash, Amit; Kaur, Hardish
MATHEMATICS AND COMPUTERS IN SIMULATION Volume: 181 Pages: 298-315 Published: MAR

2021

Stability and bifurcation analysis of a fractional predator-prey model involving two nonidentical delays
By: Yuan, Jun; Zhao, Lingzhi; Huang, Chengdai; etc.
MATHEMATICS AND COMPUTERS IN SIMULATION Volume: 181 Pages: 562-580 Published: MAR 2021

A high-order compact difference method on fitted meshes for Neumann problems of time-fractional reaction-diffusion equations with variable coefficients
By: Wang, Yuan-Ming
MATHEMATICS AND COMPUTERS IN SIMULATION Volume: 181 Pages: 598-623 Published: MAR 2021

An explicit fourth-order energy-preserving difference scheme for the Riesz space-fractional Sine-Gordon equations
By: Xing, Zhiyong; Wen, Liping; Wang, Wansheng
MATHEMATICS AND COMPUTERS IN SIMULATION Volume: 181 Pages: 624-641 Published: MAR 2021

A novel chaos based optical cryptosystem for multiple images using DNA-blend and gyrator transform
By: Chen, Hang; Liu, Zhengjun; Tanougast, Camel; etc.
OPTICS AND LASERS IN ENGINEERING Volume: 138 Published: MAR 2021

An EMD-based principal frequency analysis with applications to nonlinear mechanics
By: Lu, Sheng-Sheng; Lee, Yen-Liang; Lin, Jen-Jen; etc.
MECHANICAL SYSTEMS AND SIGNAL PROCESSING Volume: 150 Published: MAR 2021

Spectral Galerkin schemes for a class of multi-order fractional pantograph equations
By: Alsuyuti, M. M.; Doha, E. H.; Ezz-Eldien, S. S.; etc.
JOURNAL OF COMPUTATIONAL AND APPLIED MATHEMATICS Volume: 384 Published: MAR 1 2021

Numerical analysis of fractional Volterra integral equations via Bernstein approximation method
By: Usta, Fuat
JOURNAL OF COMPUTATIONAL AND APPLIED MATHEMATICS Volume: 384 Published: MAR 1 2021

Memory-dependent derivative versus fractional derivative (I): Difference in temporal modeling
By: Wang, Jin-Liang; Li, Hui-Feng
JOURNAL OF COMPUTATIONAL AND APPLIED MATHEMATICS Volume: 384 Published: MAR 1 2021

Modulating functions based differentiator of the pseudo-state for a class of fractional order linear systems
By: Wei, Yan-Qiao; Liu, Da-Yan; Boutat, Driss; etc.
JOURNAL OF COMPUTATIONAL AND APPLIED MATHEMATICS Volume: 384 Published: MAR 1 2021

Optimal bias correction of the log-periodogram estimator of the fractional parameter: A jackknife approach
By: Nadarajah, K.; Martin, Gael M.; Poskitt, D. S.
JOURNAL OF STATISTICAL PLANNING AND INFERENCE Volume: 211 Pages: 41-79 Published: MAR 2021

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Call for Papers

Fractional Delay Differential Equations and their Numerical Solutions

(Special Issue of Journal of Function Spaces)

The phenomena described by fractional differential equations with time delay are ubiquitous and widely used in nature and are an important subject of common con- cern in the fields of science and engineering. Based on the theoretical achievements and algorithms obtained by researchers, it is essential to construct new algorithms with high performance aimed at several kinds of spatial and time fractional delay differential equations, and to capture the dynamic behaviour of travelling wave solutions in systems based on these algorithms.
There are several challenges facing the field of fraction delay different equations, including the stability analysis of the delay dependence of higher-order numer- ical time integration schemes for fractional delay differential problems, and the numerical theory of the numerical scheme. Other challenges include the stability and numerical simulation of travelling wave solutions and critical travelling wave solutions of fractional delay differential equations, as well as the design of fourth- order and sixth-order compact schemes for fractional delay equations with strong nonlinearity.
The aim of this Special Issue is to provide a platform for significant contributions to the development and improvement of the theory and application of fractional delay differential equations. We welcome both original research and review articles.

Potential topics include but are not limited to:

• Delayed diffusion-wave systems, with and without distributed order in time, and their numerical analysis
• Linear multistep methods or Runge-Kutta methods for fractional or distribution fractional delay differential equations
• Numerical analysis distribution fractional delay diffusion equations based on finite difference methods
• Galerkin spectral schemes for fractional or distribution fractional delay partial differential equations
• Compact difference methods for distribution fractional delay diffusion equations or diffusion-wave equations

Important Dates:

Submission Deadline: Friday, 23 April 2021
Publication Date: September 2021

All details on this special issue are now available at: https://www.hindawi.com/journals/jfs/si/267597/?fbclid=IwAR0cLOlR0HPBe724HspDOqjTksvc6RH74zdy9BP5rn-VbiXWU2Q1Z_yAYlI.
Papers are published upon acceptance, regardless of the Special Issue publication date.

Systems Modelling, Estimation, and Control with Fractional Calculus

(Research Topic of Frontiers in Control Engineering)

The past three decades showed an exponential growth of theoretical studies and applied research on fractional calculus. The specific mathematical field is more than three centuries old, and many prominent scientists have contributed. However, after a pioneers' era in the second half of the past century, many engineering problems were only recently approached or re-considered by using tools derived from fractional calculus. Then fractional modelling and control emerged as a new promising trend. However, a system engineer is continuously facing the problem of finding a trade-off between accuracy and simplicity of implementation of the developed models. Moreover, control problems are becoming more and more complex in current times, because of the various applications – not just industrial loops or classical processes – and of the employed technologies. On the other hand, the control engineer usually appreciates simple control design and tuning rules such that memory and processing requirements are kept low, especially if multiple control devices are deployed, and their global cost should be kept low.

The knowledge of fundamental methods for systems abstraction and control design must be accompanied by the awareness of emerging approaches and techniques. Namely, the last may better describe natural or artificial processes, perform model identification and parametric estimation, define control strategies, design the controller, find its optimal parameters. The proposed topic aims at giving a perspective view of novel theories and applications of fractional calculus in the broad area of systems and control engineering, in which the art, experience and practice in system modelling and control can find many challenges.

Fractional-order modelling and control is a further opportunity not to be missed, and the readership should become more aware of it and less skeptical. Namely, fractional calculus can provide suitable tools when integer-order calculus fails to obtain an acceptable representation of the considered "object". Moreover, a fractional-order controller is more flexible with a limited increase of complexity, and in many cases the best controller for a fractional-order system should be of fractional order. It is also remarkable that fractional-order systems and controls can unveil the power of the "hidden" control technology. Finally, the interest in fractional order systems and controllers can facilitate multidisciplinary collaboration. This could be advantageous in theoretical and applied research problems, e.g. in cases when complex systems are analyzed, and advanced technologies are used, and could be very helpful in filling the theory-practice gap.

Potential authors should address topics that include but are not limited to:

• Fractional-order systems, fractional-order modeling, fractional-order dynamics
• System identification using fractional models
• Fractional-order control theory, fractional-order control schemes and algorithms
• Methods for designing, tuning, and realizing fractional-order controllers, controllers with non-integer-order differentiation and/or integration, PIλDμ-controllers
• Realization and implementation of analog and digital fractional-order controllers
• Fractional-order control applications: automotive systems, mechatronics, robotics, electro-mechanical systems, machine learning applications, industrial processes, cyber-physical systems, smart manufacturing, IoT-based applications, smart devices and systems, etc.
• Applications of fractional-order systems and controls in bioengineering and biomedical applications

Submission Deadlines:

Abstract: 1 March 2021
Manuscript: 1 June 2021

Important Note:

All contributions to this Research Topic must be within the scope of the section and journal to which they are submitted, as defined in their mission statements. Frontiers reserves the right to guide an out-of-scope manuscript to a more suitable section or journal at any stage of peer review.

All details on this special issue are now available at: https://www.frontiersin.org/research-topics/17978/systems-modelling-estimation-and-control-with-fractional-calculus?utm_source=F-RTM&utm_medium=TED1&utm_campaign=PRD_TED1_T1_RT-TITLE.

Fractional Calculus in Anomalous Transport Theory

(Special Issue of Mathematics)

Kinetic equations with fractional-order derivatives play a central role in the modeling of anomalous relaxation and diffusion processes in complex systems. The main motivations for the fractional calculus theory of anomalous kinetics are based on the following evidence. The fractional kinetic behavior belongs to the influence domain of the universal relaxation law. The fractional-order diffusion equations are connected with the known models of stochastic processes and limit theorems of the probability theory. Using non-integer order derivatives, one can develop a unified formalism that describes normal and anomalous kinetics. It is possible to take energetic and structural types of disorder in complex systems into account in common.
This Special Issue will gather the latest developments in the theory of fractional-order equations, corresponding initial boundary value problems, related stochastic processes, and their applications in the theory of fractional diffusion and anomalous relaxation in complex systems.

Keywords:

- Fractional calculus
- Anomalous diffusion
- Continuous-time random walk
- Percolation
- Quantum transport
- Nanosystems
- Monte Carlo method

Deadline for manuscript submissions:

28 February 2021

All details on this special issue are now available at:
https://www.mdpi.com/journal/mathematics/special_issues/Fractional_Calculus_Anomalous_Transport_Theory.

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Books

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Lie Symmetry Analysis of Fractional Differential Equation

(Authors:Mir Sajjad Hashemi, Dumitru Baleanu)

Details:https://www.routledge.com/Lie-Symmetry-Analysis-of-Fractional-Differential-Equations/Hashemi-Baleanu/p/book/9780367441869

Book Description:

The trajectory of fractional calculus has undergone several periods of intensive development, both in pure and applied sciences. During the last few decades fractional calculus has also been associated with the power law effects and its various applications.
It is a natural to ask if fractional calculus, as a nonlocal calculus, can produce new results within the well-established field of Lie symmetries and their applications.
In Lie Symmetry Analysis of Fractional Differential Equations the authors try to answer this vital question by analyzing different aspects of fractional Lie symmetries and related conservation laws. Finding the exact solutions of a given fractional partial differential equation is not an easy task, but is one that the authors seek to grapple with here. The book also includes generalization of Lie symmetries for fractional integro differential equations.

Features:
• Provides a solid basis for understanding fractional calculus, before going on to explore in detail Lie Symmetries and their applications.
• Useful for PhD and postdoc graduates, as well as for all mathematicians and applied researchers who use the powerful concept of Lie symmetries.
• Filled with various examples to aid understanding of the topics.

Author(s):

Mir Sajjad Hashemi is associate professor at the University of Bonab, Iran. His field of interests include the fractional differential equations, Lie symmetry method, Geometric integration, Approximate and analytical solutions of differential equations and soliton theory.
Dumitru Baleanu is professor at the Institute of Space Sciences, Magurele-Bucharest, Romania and visiting staff member at the Department of Mathematics, Cankaya University, Ankara, Turkey. His field of interests include the fractional dynamics and its applications in science and engineering, fractional differential equations, discrete mathematics, mathematical physics, soliton theory, Lie symmetry, dynamic systems on time scales and the wavelet method and its applications.

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Journals

International Journal of Heat and Mass Transfer

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Ultrafast dynamics modeling via fractional Brownian motion run with Mittag-Leffler clock in porous media
Wei Xu, Yingjie Liang, John H.Cushman, Wen Chen

The time fractional approach for the modeling of thermal therapies: Temperature analysis in laser irradiation
C. Lizama, M. Trujillo

Dual-phase-lag in the balance: Sufficiency bounds for the class of Jeffreys' equations to furnish physical solutions
Emad Awad

Transient gas diffusivity evaluation and modeling for methane and helium in coal
Ang Liu, Shimin Liu, Xiaowei Hou, Peng Liu

Design and performance of an off-grid solar combisystem using phase change materials
Arunachala Kannan, Jyoti Prakash, Daryn Roan

Three-dimensional numerical simulation of gas-liquid falling film flow characteristics on the airside of finned-tube heat exchanger with a typical large fin pitch
Yi Zhang, Guanmin Zhang, Xiaohang Qu, Maocheng Tian

Numerical study of subfreezing temperature cold start of proton exchange membrane fuel cells with zigzag-channeled flow field
Zihao Liao, Lin Wei, Ahmed Mohmed Dafalla, Zhenbang Suo, Fangming Jiang

Molecular-level evaluation and manipulation of thermal conductivity, moisture diffusivity and hydrophobicity of a GO-PVP/PVDF composite membrane
Si Zeng, Qianwen Su, Li-Zhi Zhang

Modeling of heat transport and exact analytical solutions in thin films with account for constant non-relativistic motion
K. Zhukovsky, D. Oskolkov

The effect of the molecular weight and polydispersity index on the thermal conductivity of Polyamide 6: A molecular dynamics study
Nikoo Ghahramani, Mahmoud Rahmati

Second law assessment of nanofluid flow in a channel fitted with conical ribs for utilization in solar thermal applications: Effect of nanoparticle shape

Mehdi Bahiraei, Ali Monavari, Hossein Moayedi

Simulation of pool boiling regimes for a sphere using a hydrogen evolving system
Je-Young Moon, Bum-Jin Chung

Effects of Pr and pool curvature on thermocapillary flow instabilities in annular pool
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Many-body effective thermal conductivity in phase-change nanoparticle chains due to near-field radiative heat transfer
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Advances in Water Resources

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An efficient approximation of non-Fickian transport using a time-fractional transient storage model
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Impact of absorbing and reflective boundaries on fractional derivative models: Quantification, evaluation and application
Yong Zhang, Xiangnan Yu, Xicheng Li, James F.Kelly, HongGuang Sung, Chunmiao Zheng

Simulating multi-dimensional anomalous diffusion in nonstationary media using variable-order vector fractional-derivative models with Kansa solver
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Pore–scale analysis of supercritical CO2–brine immiscible displacement under fractional–wettability conditions
Sahar Bakhshian, Seyyed Abolfazl Hosseini

On the prediction of three-phase relative permeabilities using two-phase constitutive relationships
Gerhard Schäfer, Raphaëldi Chiara Roupert, Amir H.Alizadeh, Mohammad Piri

A comparison of estimators of the conditional mean under non-stationary conditions
Richard M. Vogel, Charles N. Kroll

Pore-scale imaging with measurement of relative permeability and capillary pressure on the same reservoir sandstone sample under water-wet and mixed-wet conditions
Ying Gao, Ali Q.Raeini, Ahmed M.Selem, Igor Bondino, Martin J.Blunt, Branko Bijeljic

Pore occupancy, relative permeability and flow intermittency measurements using X-ray micro-tomography in a complex carbonate
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Wettability alteration implications on pore-scale multiphase flow in porous media using the lattice Boltzmann method
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Detecting inundation thresholds for dryland wetland vulnerability
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High-Schmidt-number dissolved oxygen transfer from turbulent flows to permeable microbial sediment bed
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Upscaled equations for two-phase flow in highly heterogeneous porous media: Varying permeability and porosity
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Paper Highlight

Sir Isaac Newton Stranger in a Strange Land

Bruce J. West

Publication information: Entropy, Volume 22 Issue 11, 25 October 2020, 1204

https://doi.org/10.3390/e22111204

Abstract

The theme of this essay is that the time of dominance of Newton’s world view in science is drawing to a close. The harbinger of its demise was the work of Poincaré on the three-body problem and its culmination into what is now called chaos theory. The signature of chaos is the sensitive dependence on initial conditions resulting in the unpredictability of single particle trajectories. Classical determinism has become increasingly rare with the

advent of chaos, being replaced by erratic stochastic processes. However, even the probability calculus could not withstand the non-Newtonian assault from the social and life sciences. The ordinary partial differential equations that traditionally determined the evolution of probability density functions (PDFs) in phase space are replaced with their fractional counterparts. Allometry relation is proven to result from a system's complexity using exact solutions for the PDF of the Fractional Kinetic Theory (FKT). Complexity theory is shown to be incompatible with Newton's unquestioning reliance on an absolute space and time upon which he built his discrete calculus.

Keywords

Complexity; Chaos; Fractional calculus; Subordination

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Fast Mixing in Heterogeneous Media Characterized by Fractional Derivative Model

Yingjie Liang, Zhi Dou, Lizhou Wu, Zhifang Zhou

Publication information: Transport in Porous Media, Volume 134 Pages 387-397, 15 July 2020
https://doi.org/10.1007/s11242-020-01450-9

Abstract

This study aims at investigating non-Fickian temporal scaling of fast mixing processes using fractional advection dispersion equation (FADE) model in Indiana carbonate, multi-lognormal hydraulic conductivity field, self-affine fractures and cemented porous media, in which the fundamental solution of the FADE model is a standard symmetric Lévy stable distribution. The temporal scaling of the scalar dissipation rate (SDR) induced by the FADE model is a function of fractional derivative order α, $X(t)\sim t^{-(\alpha+1)/\alpha}$, $(1\leq\alpha\leq2)$, and it reduces to the Fikian scaling $t^{-3/2}$ when α=2. Smaller values of α reflect more efficient and a better mixing state at early time. The fitted results show that the FADE model is much more accurate than the traditional model, which can also well interpret the fast mixing scaling from clearer physical mechanism than the empirical power law fitting line. The fitted values of α capture the complexity of the heterogeneous media, which are consistent with the existing empirical results. Thus, the SDR of the FADE model is feasible to describe the temporal scaling of the fast mixing for the tracer transport in heterogeneous media.

Keywords:

Fractional derivative; Fast mixing; Scalar dissipation rate; Anomalous diffusion; Heterogeneous media

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The End of This Issue
