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[Fractional Calculus & Applied Analysis](#)

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## Latest SCI Journal Papers on FDA

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(Searched on 30th September 2014)

[A Collocation Method for Solving Fractional Riccati Differential Equation](#)

By: Gulsu, Mustafa; Ozturk, Yalcin; Anapali, Ayse

ADVANCES IN APPLIED MATHEMATICS AND MECHANICS Volume: 5 Issue:  
6 Pages: 872-884 Published: DEC 2014

[Approximate controllability of impulsive fractional neutral evolution equations with Riemann-Liouville fractional derivatives](#)

By: Liu, Xianghu; Liu, Zhenhai; Bin, Maojun

JOURNAL OF COMPUTATIONAL ANALYSIS AND APPLICATIONS Volume: 17 Issue:  
3 Pages: 468-485 Published: NOV 2014

[Analytic study on a state observer synchronizing a class of linear fractional differential systems](#)

By: Zhou, Xian-Feng; Huang, Qun; Jiang, Wei; et al.

COMMUNICATIONS IN NONLINEAR SCIENCE AND NUMERICAL  
SIMULATION Volume: 19 Issue: 10 Pages: 3808-3819 Published: OCT 2014

[Design of digital Feller fractional order integrator](#)

By: Tseng, Chien-Cheng; Lee, Su-Ling

SIGNAL PROCESSING Volume: 102 Pages: 16-31 Published: SEP 2014

[A class of nonlinear differential equations with fractional integrable impulses](#)

By: Wang, JinRong; Zhang, Yuruo

COMMUNICATIONS IN NONLINEAR SCIENCE AND NUMERICAL  
SIMULATION Volume: 19 Issue: 9 Pages: 3001-3010 Published: SEP 2014

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## Books

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### **Advances in Robust Fractional Control**

Fabrizio Padula, Antonio Visioli

#### **Book Description**

The aim of this book is to present design methodologies for fractional control systems. Here, fractional control system means that the controller, the process or both can be fractional. Different approaches are described but the common framework is that the robustness of the control system is considered explicitly in the design. Accordingly, the first part of the book is more industrial oriented and is focused on the design of fractional controllers for integer processes, aiming at evaluating the difference between fractional and integer control. In particular, fractional-order proportional-integral-derivative controllers are considered, since integer-order proportional-integral-derivative regulators are, undoubtedly, the most employed controllers in industry. The second part of the book deals with a more general approach to fractional control systems. Well-known and effective techniques for integer-order systems, such as optimal control and optimal input–output-inversion-based control are extended to fractional systems.

More information on this book can be found by the following link:

<http://link.springer.com/book/10.1007/978-3-319-10930-5>

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### **Advances in Modelling and Control of Non-integer-Order Systems**

Krzysztof J. Latawiec, Marian Łukaniszyn, Rafał Stanisławski

#### **Book Description**

The fractional calculus has recently attracted an unprecedented research interest both from the academia and various application-related environments. The field has experienced a publication explosion and apparently matured but it is still far from conceptual completeness both in the theory and, in particular, applications and implementations. This volume presents one small step

ahead in the development of the theory and applications of the fractional calculus. Divided into six parts, it provides a bunch of new results in, consecutively, mathematical fundamentals, approximation, modeling and simulations, controllability and control, stability analysis and applications of various noninteger-order methodologies.

More information on this book can be found by the following link:

<http://link.springer.com/book/10.1007/978-3-319-09900-2>

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## Journals

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### Applied Mathematics and Computation

Volume 245, Pages 1-592 (selected)

[New hybrid conjugate gradient method for unconstrained optimization](#)

J.K. Liu, S.J. Li

[Global stochastic stability analysis for stochastic neural networks with infinite delay and Markovian switching](#)

Ying Guo, Huan Su, Xiaohua Ding, Ke Wang

[Sobolev type fractional abstract evolution equations with nonlocal conditions and optimal multi-controls](#)

Amar Debbouche, Juan J. Nieto

[Power law approximations for radioactive decay chains](#)

Frank Massey, Jeffrey Prentis

[Lyapunov-type inequality for a class of even-order linear differential equations](#)

Xiaojing Yang, Yong-In Kim, Kueiming Lo

[Analysis of an integro-differential system modeling tumor growth](#)

Lucia Maddalena

[A novel class of fractionally orthogonal quasi-polynomials and new fractional quadrature formulas](#)

Milan R. Rapaic, Tomislav B. Šekara, Vidan Govedarica

[Some new nonlinear Volterra–Fredholm type dynamic integral inequalities on time scales](#)

Juan Gu, Fanwei Meng

[On the particular solution of constant coefficient fractional differential equations](#)

Manuel D. Ortigueira

[The long time behavior of a predator–prey model with disease in the prey by stochastic perturbation](#)

Qiumei Zhang, Daqing Jiang, Zhenwen Liu, Donal O’Regan

[Finite-time stochastic input-to-state stability of impulsive switched stochastic nonlinear systems](#)

Zidong Ai, Guangdeng Zong

[Existence of local solutions for a class of delayed neural networks with discontinuous activations](#)

Mingjiu Gai, Xiaolei Liu, Jian Yuan

[Global dynamics for Lotka–Volterra systems with infinite delay and patch structure](#)

Teresa Faria

[Support vector machine adapted Tikhonov regularization method to solve Dirichlet problem](#)

Yan Mo, Tao Qian

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## Communications in Nonlinear Science and Numerical Simulation

Volume 20, Issue 3(selected)

[A theorem of uniqueness of the solution of nonlocal evolution boundary value problem](#)

Yulian Tsankov

[Analysis of Hamiltonian Boundary Value Methods \(HBVMs\): A class of energy-preserving Runge–Kutta methods for the numerical solution of polynomial Hamiltonian systems](#)

Luigi Brugnano, Felice Iavernaro, Donato Trigiante

[Time-dependent exact solutions for Rosenau–Hyman equations with variable coefficients](#)

Wescley Luiz de Souza, Érica de Mello Silva

[Domain decomposition multigrid methods for nonlinear reaction–diffusion problems](#)

Arrarás, F.J. Gaspar, L. Portero, C. Rodrigo

[Lyapunov stability theorem about fractional system without and with delay](#)

Jian-Bing Hu, Guo-Ping Lu, Shi-Bing Zhang, Ling-Dong Zhao

[A mechanical picture of fractional-order Darcy equation](#)

Luca Deseri, Massimiliano Zingales

[Asymptotic behavior of a stochastic non-autonomous predator–prey model with impulsive perturbations](#)

Ruihua Wu, Xiaoling Zou, Ke Wang

[Improved conditions for global exponential stability of a general class of memristive neural networks](#)

Ailong Wu, Zhigang Zeng

[Complex projective synchronization in drive-response stochastic coupled networks with complex-variable systems and coupling time delays](#)

Xuefei Wu, Chen Xu, Jianwen Feng

[Stabilizing the unstable periodic orbits of a hybrid chaotic system using optimal control](#)

Yosra Miladi, Moez Feki, Nabil Derbel

[Hopf bifurcation of a generalized Moon–Rand system](#)

Jaume Llibre, Clàudia Valls

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## Paper Highlight

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### Numerical solution of the space fractional Fokker–Planck equation

F. Liu, V. Anh, I. Turner

**Publication information:** F. Liu, V. Anh, I. Turner, Numerical solution of the space fractional Fokker–Planck equation, *Journal of Computational and Applied Mathematics*, 166(1), 2004, Pages 209-219.

<http://www.sciencedirect.com/science/article/pii/S0377042703008616>

#### Abstract

The traditional second-order Fokker–Planck equation may not adequately describe the movement of solute in an aquifer because of large deviation from the dynamics of Brownian motion. Densities of  $\alpha$ -stable type have been used to describe the probability distribution of these motions. The resulting governing equation of these motions is similar to the traditional Fokker–Planck equation except that the order  $\alpha$  of the highest derivative is fractional. In this paper, a space fractional Fokker–Planck equation (SFFPE) with instantaneous source is considered. A numerical scheme for solving SFFPE is presented. Using the Riemann–Liouville and Grünwald–Letnikov definitions of fractional derivatives, the SFFPE is transformed into a system of ordinary differential equations (ODE). Then the ODE system is solved by a method of lines. Numerical results for SFFPE with a constant diffusion coefficient are evaluated for comparison with the

known analytical solution. The numerical approximation of SFFPE with a time-dependent diffusion coefficient is also used to simulate Lévy motion with  $\alpha$ -stable densities. We will show that the numerical method of SFFPE is able to more accurately model these heavy-tailed motions.

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## Box-type scheme for fractional sub-diffusion equation with Neumann boundary conditions

Xuan Zhao, Zhi-zhong Sun

**Publication information:** Xuan Zhao, Zhi-zhong Sun, box-type scheme for fractional sub-diffusion equation with Neumann boundary conditions, Journal of Computational Physics, 230(15)(2011), pp. 6061-6074.

<http://www.sciencedirect.com/science/article/pii/S0021999111002373>

### Abstract

Combining order reduction approach and L1 discretization, a box-type scheme is presented for solving a class of fractional sub-diffusion equation with Neumann boundary conditions. A new inner product and corresponding norm with a Sobolev embedding inequality are introduced. A novel technique is applied in the proof of both stability and convergence. The global convergence order in maximum norm is  $O(\tau^{2-\alpha} + h^2)$ . The accuracy and efficiency of the scheme are checked by two numerical tests.

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## A semi-discrete finite element method for a class of time-fractional diffusion equations

HongGuang Sun, Wen Chen, K.Y. Sze

**Publication information:** HongGuang Sun, Wen Chen, K.Y. Sze. A semi-discrete finite element method for a class of time-fractional diffusion equations. Philosophical Transactions of The Royal Society A, 2013, 371, 20120268.

<http://rsta.royalsocietypublishing.org/content/371/1990/20120268>

**Abstract**

As fractional diffusion equations can describe the early breakthrough and the heavy-tail decay features observed in anomalous transport of contaminants in groundwater and porous soil, they have been commonly used in the related mathematical descriptions. These models usually involve long-time-range computation, which is a critical obstacle for their application; improvement of computational efficiency is of great significance. In this paper, a semi-discrete method is presented for solving a class of time-fractional diffusion equations that overcome the critical long-time-range computation problem. In the procedure, the spatial domain is discretized by the finite element method, which reduces the fractional diffusion equations to approximate fractional relaxation equations. As analytical solutions exist for the latter equations, the burden arising from long-time-range computation can effectively be minimized. To illustrate its efficiency and simplicity, four examples are presented. In addition, the method is used to solve the time-fractional advection–diffusion equation characterizing the bromide transport process in a fractured granite aquifer. The prediction closely agrees with the experimental data, and the heavy-tail decay of the anomalous transport process is well represented.

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