FDA Express  Vol. 10, No. 6, Mar. 30, 2014

Editors:  http://em.hhu.edu.cn/fda/Editors.htm
Institute of Soft Matter Mechanics, Hohai University
For contribution:  fdaexpress@163.com, pangguofei2008@126.com
For subscription:  http://em.hhu.edu.cn/fda/subscription.htm

◆  Latest SCI Journal Papers on FDA
(Searched on 29th March 2014)

◆  Books

Special Functions in Fractional Calculus and Related Fractional Differintegral Equations

Fractional Calculus with Applications in Mechanics: Vibrations and Diffusion Processes

◆  Journals

Computers & Mathematics with Applications

Physica A: Statistical Mechanics and its Applications

Special Issue on Analysis of Fractional Dynamic Systems(The Scientific World Journal)

◆  Paper Highlight

Fractional diffusion and Lévy stable processes

Stochastic solution of space-time fractional diffusion equations

◆  Websites of Interest

Fractional Calculus & Applied Analysis

International Conference on Fractional Differentiation and Its Applications (ICFDA'14)
(Searched on 29th March 2014)

**Trajectory Tracking Control for a 3-DOF Parallel Manipulator Using Fractional-Order (PID\(\mu\))-D-\(\lambda\) Control**
By: Dumlu, Ahmet; Erenturk, Koksal
IEEE TRANSACTIONS ON INDUSTRIAL ELECTRONICS
Volume: 61 Issue: 7 Pages: 3417-3426 Published: JUL 2014

**Weak convergence of a fully discrete approximation of a linear stochastic evolution equation with a positive-type memory term**
By: Kovacs, Mihaly; Printems, Jacques
JOURNAL OF MATHEMATICAL ANALYSIS AND APPLICATIONS
Volume: 413 Issue: 2 Pages: 939-952 Published: MAY 15 2014

**A note on some new series of special functions**
By: Gaboury, S.; Tremblay, R.
INTEGRAL TRANSFORMS AND SPECIAL FUNCTIONS
Volume: 25 Issue: 5 Pages: 336-343 Published: MAY 4 2014

**Operational calculus for the Caputo-type fractional Erdelyi-Kober derivative and its applications**
By: Hanna, L. A. -M.; Luchko, Yu. F.
INTEGRAL TRANSFORMS AND SPECIAL FUNCTIONS
Volume: 25 Issue: 5 Pages: 359-373 Published: MAY 4 2014

**Fractional heat conduction with finite wave speed in a thermo-visco-elastic spherical shell**
By: Sur, A.; Kanoria, M.
LATIN AMERICAN JOURNAL OF SOLIDS AND STRUCTURES
Volume: 11 Issue: 7 Pages: 1132-1162 Published: 2014

[Back]
Books

Special Functions in Fractional Calculus and Related Fractional Differintegral Equations

Hari M. Srivastava

Book Description

The subject of fractional calculus (that is, calculus of integrals and derivatives of any arbitrary real or complex order) has gained considerable popularity and importance during the past four decades, due mainly to its demonstrated applications in numerous seemingly diverse and widespread fields of science and engineering. It does indeed provide several potentially useful tools for solving differential, integral and differ-integral equations, and various other problems involving special functions of mathematical physics as well as their extensions and generalizations in one and more variables. Many books and monographs (and conference proceedings) deal with the subject of fractional calculus and its applications. However, to the best of our knowledge, there does not exist an exclusive work that co-ordinates the disciplines of fractional calculus and special functions in a potentially useful manner. This book is an attempt in that direction and would serve a dual purpose: in providing key formulas and identities involving special functions and also in opening up some novel avenues of applications of fractional calculus.

More information on this book can be found by the following link:
http://books.google.com.hk/books?id=cjzAngEACAAJ&q=fractional+calculus&hl=zh-CN&sa=X&ei=fB02U-HWHtG7iAe7gIHoDA&ved=0CD0Q6AEwBQ

[Back]

Fractional Calculus with Applications in Mechanics: Vibrations and Diffusion Processes
Book Description

This book contains mathematical preliminaries in which basic definitions of fractional derivatives and spaces are presented. The central part of the book contains various applications in classical mechanics including fields such as: viscoelasticity, heat conduction, wave propagation and variational Hamilton-type principles. Mathematical rigor will be observed in the applications. The authors provide some problems formulated in the classical setting and some in the distributional setting. The solutions to these problems are presented in analytical form and these solutions are then analyzed numerically. Theorems on the existence of solutions will be presented for all examples discussed. In using various constitutive equations the restrictions following from the second law of thermodynamics will be implemented. Finally, the physical implications of obtained solutions will be discussed in detail.

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

Journals

Computers & Mathematics with Applications

Volume 67, Issue 5


Mohamed A.E. Herzallah

A fixed-point method for a class of super-large scale nonlinear complementarity problems

Jian Xun Zhao
An active set truncated Newton method for large-scale bound constrained optimization

Wanyou Cheng, Zixin Chen, Dong-hui Li

A meshless interpolation algorithm using a cell-based searching procedure

Roberto Cavoretto, Alessandra De Rossi

A momentum exchange-based immersed boundary-lattice Boltzmann method for simulating a flexible filament in an incompressible flow

Hai-Zhuan Yuan, Xiao-Dong Niu, Shi Shu, Mingjun Li, Hiroshi Yamaguchi

On refined Ritz vectors and polynomial characterization

Mashetti Ravibabu, Arindama Singh

Simultaneous determination of time-dependent coefficients in the heat equation

M.S. Hussein, D. Lesnic, M.I. Ivanchov

An octahedral equal area partition of the sphere and near optimal configurations of points

Adrian Holhoș, Daniela Roșca

On the initial value problem of fractional evolution equations with noncompact semigroup

Pengyu Chen, Yongxiang Li, Qiyu Chen, Binhua Feng

Computational homogenisation of composite plates: Consideration of the thickness change with a modified projection strategy

Cécile E. Helfen, Stefan Diebels

Superconvergence and a posteriori error estimates for the LDG method for convection–diffusion problems in one space dimension

Mahboub Baccouch

Topology optimization of the shear thinning non-Newtonian fluidic systems for minimizing wall shear stress

Jaeyub Hyun, Semyung Wang, Sung Yang

A two-dimensional Poisson equation formulation of non-parametric statistical non-linear modeling
S. Fiori

**Computation of the monodromy matrix in floating point arithmetic with the Wilkinson Model**

Ali Osman Çibikdiken, Kemal Aydin

[Back]

---

**Physica A: Statistical Mechanics and its Applications**

**Volume 405**(selected)

**The effect of exclusion on nonlinear reaction–diffusion system in inhomogeneous media**

Trilochan Bagarti, Anupam Roy, K. Kundu, B.N. Dev

**Fokker–Planck type equations associated with fractional Brownian motion controlled by infinitely divisible processes**

Janusz Gajda, Agnieszka Wyłomańska

**Scaling of production data obtained from Random Walk Particle Tracking simulations in highly fractured porous media**

Ekaterina Stalgorova, Tayfun Babadagli

**Persistence intervals of fractals**

Gabriell Máte, Dieter W. Heermann

**Detrended minimum-variance hedge ratio: A new method for hedge ratio at different time scales**

Gang-Jin Wang, Chi Xie, Ling-Yun He, Shou Chen

**Percolation modeling of self-damaging of composite materials**

Sergii Domanskyi, Vladimir Privman

**A study on modeling the dynamics of statistically dependent returns**
Hamed Davari-Ardakani, Majid Aminnayeri, Abbas Seifi

**Multifractal analyses of daily rainfall time series in Pearl River basin of China**

Zu-Guo Yu, Yee Leung, Yongqin David Chen, Qiang Zhang, Vo Anh, Yu Zhou

**Urban signalised intersections: Impact of vehicle heterogeneity and driver type on cross-traffic manoeuvres**

Puspita Deo, Heather J. Ruskin

**Quantum correlations from classically correlated states**


[Back]

---

**Special Issue on Analysis of Fractional Dynamic Systems (The Scientific World Journal)**

The Scientific World Journal (Paper No, 760634)

Special Issue on Analysis of Fractional Dynamic Systems

**Fawang Liu**, **Richard Magin**, **Changpin Li**, **Alla Sikorski** and **Santos Bravo Yuste**

1**Fawang Liu**, School of Mathematical Sciences, Queensland University of Technology, P.O. Box 2434, Brisbane, QLD 4001, Australia;  [fliu@qut.edu.au](mailto:fliu@qut.edu.au)

2**Richard Magin**, Department of Bioengineering, University of Illinois, 851 South Morgan Street, Chicago, IL 60607, USA;  [magin@uic.edu](mailto:magin@uic.edu).

3**Changpin Li**, Department of Mathematics, Shanghai University, Shanghai, China;  [kcp@shu.edu.cn](mailto:kcp@shu.edu.cn)
It is our pleasure to bring this special issue of *The Scientific World Journal* dedicated to *Analysis of Fractional Dynamic Systems*.

Due to the extensive applications of fractional differential equations (FDEs) in engineering and science, research in this area has grown significantly. Fractional Dynamic Systems are described by FDEs, and this special issue on Analysis of Fractional Dynamic Systems consists of 8 original articles covering various aspects of FDEs and their applications written by prominent researchers in the field.

Paper No. 143983 investigates the numerical solution for a class of fractional diffusion-wave equations with a variable coefficient. The approach is based on the collocation technique where the shifted Chebyshev polynomials in time and the sinc functions in space are utilized respectively.

Paper No. 982413 analyzes a fully discrete leapfrog/Galerkin finite element method for the numerical solution of the space fractional order diffusion. The fractional diffusion equations are discretized in space by the finite element method and in time by the explicit leap-frog scheme. For the resulting fully discrete, conditionally stable scheme the authors an L2-error bound of finite element accuracy and of second order in time.

Paper No. 402373 studies and develops recursion formulas to compute the coefficients in the higher-order schemes approximating Riemann-Liouville integrals and derivatives. The fractional Runge’s phenomena are observed when the pth-order numerical scheme (p=7, 8, 9, 10) is used, which means that pth-order algorithms (p≥7) for Riemann-Liouville derivative seems not to be appropriate.

Paper No. 306237 develops two different approaches based on the spectral method for some types of fractional optimal control problems. The spectral method given here is based on the Chebyshev polynomials to approximate the unknown functions. Necessary and sufficient optimality conditions are obtained in the first approach, where the Hamiltonian functional is defined. In the second approach the Clenshaw and Curtis procedure for the numerical integration of a non-singular functions and Rayleigh-Ritz method are used to evaluate both the state and control variables.

Paper No. 645080 derives the sufficient and necessary conditions of stability of nonlinear distributed order fractional system and then the integer-order Chen system is generalized into the distributed order fractional domain. Based on the asymptotic stability theory of nonlinear distributed order fractional systems, the stability of distributed order fractional Chen system is
discussed.

Paper No. 605412 discusses the monotonicity, the concavity and the convexity of some functions arising in solutions of fractional differential equations. The results can be used in describing properties of the solutions.

Paper No. 182508 proposes a coupled directed continuous time random walk model, where the random walker jumps toward one direction and the waiting time between jumps affects the subsequent jump. The limit distribution of the continuous time random walk and the corresponding evolving equations are derived.

Finally, Paper No. 219580 introduces and discusses a parallel algorithm for a two dimensional time fractional differential equation (2D-TFDE). A task distribution model with virtual boundary is designed for this parallel algorithm.

Thus, this special issue provides a wide spectrum of current research in the area of Analysis of Fractional Dynamic Systems, and we hope that experts in this and related fields find it useful.

Fawang Liu
Richard Magin
Changpin Li
Alla Sikorskii
Santos Bravo Yuste

Contents:

1. 143983 titled "Sinc-Chebyshev collocation method for a class of fractional diffusion-wave equations " by Zhi Mao, Aiguo Xiao, Zuguo Yu and Long Shi.
2. 982413 titled "Leapfrog/finite element method of fractional diffusion equation" by Zhengang Zhao and Yunying Zheng.
3. 402373 titled "Determination of coefficients of high-order schemes for Riemann-Liouville derivative " by Rifang Wu, Hengfei Ding and Changpin Li.
4. 306237 titled "Numerical studies for some types of fractional optimal control problems" by Nasser Hassan Sweilam and Tamer Mostafa Al-Ajmi.
5. 645080 titled "Stability analysis of distributed order fractional Chen system" by H. Aminikhah, A. Refahi Sheikhan and H. Rezazadeh.
6. 605412 titled "Monotonicity, concavity and convexity of functions with fractional derivative" by Xian-Feng Zhou, Song Liu, Zhixin Zhang and Wei Jiang.
7. 182508 titled "A directed continuous time random walk model with jump length depending on waiting time" by Long Shi, Zugo Yu, Zhi Mao and Aiguo Xiao.
8. 219580 titled "A parallel algorithm for the two dimensional time fractional diffusion equation with implicit difference method" by Chunye Gong, Weimin Bao, Guojian Tang, Yuewen Jiang and Jie Liu.

[Back]
Stochastic solution of space-time fractional diffusion equations

Mark M. Meerschaert, David A. Benson, Hans-Peter Scheffler, and Boris Baeumer


http://journals.aps.org/pre/abstract/10.1103/PhysRevE.65.041103

Abstract

Classical and anomalous diffusion equations employ integer derivatives, fractional derivatives, and other pseudodifferential operators in space. In this paper we show that replacing the integer time derivative by a fractional derivative subordinates the original stochastic solution to an inverse stable subordinator process whose probability distributions are Mittag-Leffler type. This leads to explicit solutions for space-time fractional diffusion equations with multiscaling space-fractional derivatives, and additional insight into the meaning of these equations.

[Back]

The End of This Issue