FDA Express   Vol. 13, No. 4, Nov. 30, 2014

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A high-accuracy preserving spectral Galerkin method for the Dirichlet boundary-value problem of variable-coefficient conservative fractional diffusion equations

Asymptotic behavior of solutions for nonlinear elliptic problems with the fractional Laplacian

◆　**Websites of Interest**

Fractional Calculus & Applied Analysis

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Latest SCI Journal Papers on FDA

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True Versus Spurious Long Memory: Some Theoretical Results and a Monte Carlo Comparison
By: Leccadito, Arturo; Rachedi, Omar; Urga, Giovanni
ECONOMETRIC REVIEWS Volume: 34 Issue: 4 Pages: 452-479 Published: APR 21 2015

Controllability of h-difference linear control systems with two fractional orders
By: Mozyrska, Dorota; Pawluszewicz, Ewa
INTERNATIONAL JOURNAL OF SYSTEMS SCIENCE Volume: 46 Issue: 4 Pages: 662-669
Published: MAR 12 2015

InSAR Image Regularization and DEM Error Correction With Fractal Surface Scattering Model
By: Danudirdjo, Donny; Hirose, Akira
IEEE TRANSACTIONS ON GEOSCIENCE AND REMOTE SENSING Volume: 53 Issue: 3
Pages: 1427-1439 Published: MAR 2015

A nonpolynomial collocation method for fractional terminal value problems
By: Ford, N. J.; Morgado, M. L.; Rebelo, M.
JOURNAL OF COMPUTATIONAL AND APPLIED MATHEMATICS Volume: 275 Pages:
392-402 Published: FEB 2015

The multiplicity of nontrivial solutions for hemivariational inequalities involving nonlocal elliptic
operators
By: Xi, Lijing; Huang, Yisheng; Zhou, Yuying
NONLINEAR ANALYSIS-REAL WORLD APPLICATIONS Volume: 21 Pages: 87-98
Published: FEB 2015

Asymptotic properties and numerical simulation of multidimensional Levy walks
By: Magdziarz, Marcin; Teuerle, Marek
COMMUNICATIONS IN NONLINEAR SCIENCE AND NUMERICAL SIMULATION
Volume: 20 Issue: 2 Pages: 489-505 Published: FEB 2015

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Books

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Inference on the Hurst Parameter and the Variance of Diffusions Driven by Fractional Brownian Motion

Corinne Berzin, Alain Latour, José R. León

Book Description

The use of diffusion models driven by fractional noise has become popular for more than two decades. The reasons that produced this situation have been varied in nature. We can mention, among others, those that come from mathematics and other from the applications. The notes are aimed at a mixed audience. They can be used in a graduate course in statistics of Gaussian processes, as well as a reference book for researchers in the field and as a guide for those interested in the applications of fractional models.

More information on this book can be found by the following link:
http://link.springer.com/book/10.1007/978-3-319-07875-5

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Fractional Derivatives for Physicists and Engineers

Vladimir V. Uchaikin

Book Description

The first three chapters of the book are united into the first part "Background" which contains description of various natural phenomena demonstrating such properties. The second part of the

book, "Theory", contains the elements of fractional calculus theory with review of various fractional equations, and their analytical and numerical solutions. The third part, opening the second volume of the book, exposes a wide field of applications of fractional calculus in modern physics including mechanics, hydrodynamics, viscoelasticity, thermodynamics, electrodynamics, plasma physics, quantum physics, and cosmic ray physics. Finally, the fourth, last part of the book contains various auxiliary materials (special functions, notation of fractional derivatives, main formulas of fractional calculus, tables and graphs of some functions, which are playing a special role in the solution of fractional equations).

More information on this book can be found by the following link:
http://www.springer.com/physics/theoretical,+mathematical+&+computational+physics/book/978-3-642-33910-3

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Journals

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Journal of Computational Physics

Volume 276 -Volume 281 (selected)

Galerkin finite element method for two-dimensional Riesz space fractional diffusion equations

Weiping Bu, Yifa Tang, Jiye Yang

A posteriori error estimates, stopping criteria, and adaptivity for multiphase compositional Darcy flows in porous media

Daniele A. Di Pietro, Eric Flauraud, Martin Vohralík, Soleiman Yousef

Paper Highlight

A high-accuracy preserving spectral Galerkin method for the Dirichlet boundary-value problem of variable-coefficient conservative fractional diffusion equations

Hong Wang, Xuhao Zhang

Abstract

Fractional diffusion equations were shown to provide an adequate and accurate description of transport processes exhibiting anomalous diffusion behavior. Recently, spectral Galerkin methods were developed for space-fractional diffusion equations aiming at achieving exponential convergence. An optimal order error estimate in the fractional energy norm was proved under the assumption that the true solution to the fractional diffusion equation has the desired regularity. An optimal order error estimate in the L2 norm was proved via the well known Nitsche lifting technique under the assumption that the true solution to the corresponding boundary-value problem of the fractional diffusion equation has the required regularity for each right-hand side.

In this paper we show that the true solution to the Dirichlet boundary-value problem of a conservative fractional diffusion equation of order $2-\beta$ with $0<\beta<1$ as well as a constant diffusivity coefficient and a constant source term is not in the fractional Sobolev space H3/2−β in general, but is still in the Besov space . Hence, the provable convergence rate of a spectral Galerkin method in the L2 norm is at most of the order $O(N^{-(3/2-\beta)})$, where N is the degree of the polynomial space in the numerical method. Numerical experiments show that the spectral Galerkin method exhibits a subquadratic convergence in the L2 norm for any $0<\beta<1$.

We develop a high-accuracy preserving spectral Galerkin method for the Dirichlet boundary-value problem of one-sided variable-coefficient conservative fractional diffusion equations. The method has a proved high-order convergence rate of arbitrary order (i) without requiring the smoothness of the true solution u to the given boundary-value problem, but only assuming that the diffusivity coefficient and the right-hand source term have the desired regularity; (ii) for a variable diffusivity coefficient; and (iii) for an inhomogeneous Dirichlet boundary

condition. Numerical experiments substantiate the theoretical analysis and show that the method exhibits exponential convergence provided the diffusivity coefficient and the right-hand source term have the desired regularity.

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Asymptotic behavior of solutions for nonlinear elliptic problems with the fractional Laplacian

Woocheol Choi, Seunghyeok Kim, Ki-Ahm Lee

Abstract
In this paper we study the asymptotic behavior of least energy solutions and the existence of multiple bubbling solutions of nonlinear elliptic equations involving the fractional Laplacians and the critical exponents. This work can be seen as a nonlocal analog of the results of Han (1991) [24] and Rey (1990) [35].

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The End of This Issue

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