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Fractional Calculus & Applied Analysis, Volume 16, No 1, 2013

NEWSLETTER, Centre for Mathematical Sciences, India, Volume 15, Number 2, 2012

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Latest SCI Journal Papers on FDA

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(Searches on 15 January 2013)

from ISI Web of Science (SCI)

Title: Analytical solutions for the multi-term time-space fractional advection-diffusion equations with mixed boundary conditions
Author(s): Ding, Xiao-Li; Jiang, Yao-Lin
Source: NONLINEAR ANALYSIS-REAL WORLD APPLICATIONS Volume: 14 Issue: 2 Pages: 1026-1033 DOI: 10.1016/j.nonrwa.2012.08.014 Published: APR 2013

Title: A sum operator method for the existence and uniqueness of positive solutions to Riemann-Liouville fractional differential equation boundary value problems
Author(s): Zhai, Chengbo; Yan, Weiping; Yang, Chen
Source: COMMUNICATIONS IN NONLINEAR SCIENCE AND NUMERICAL SIMULATION Volume: 18 Issue: 4 Pages: 858-866 DOI: 10.1016/j.cnsns.2012.08.037 Published: APR 2013

Title: Multivariate stable distributions and generating densities
Author(s): Fallahgoul, Hassan; Hashemiparast, S. M.; Fabozzi, Frank J.; et al.

Source: APPLIED MATHEMATICS LETTERS Volume: 26 Issue: 3 Pages: 324-329 DOI: 10.1016/j.aml.2012.09.009 Published: MAR 2013

Title: Fractional equations of Volterra type involving a Riemann-Liouville derivative
Author(s): Jankowski, Tadeusz
Source: APPLIED MATHEMATICS LETTERS Volume: 26 Issue: 3 Pages: 344-350 DOI: 10.1016/j.aml.2012.10.002 Published: MAR 2013

Title: High order finite difference WENO schemes for fractional differential equations
Author(s): Deng, Weihua; Du, Shanda; Wu, Yujiang
Source: APPLIED MATHEMATICS LETTERS Volume: 26 Issue: 3 Pages: 362-366 DOI: 10.1016/j.aml.2012.10.005 Published: MAR 2013

Title: Statistical mechanics of an ideal gas of non-Abelian anyons
Author(s): Mancarella, Francesco; Trombettoni, Andrea; Mussardo, Giuseppe
Source: NUCLEAR PHYSICS B Volume: 867 Issue: 3 Pages: 950-976 DOI: 10.1016/j.nuclphysb.2012.10.020 Published: FEB 21 2013

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Conferences

2013 ASME/IEEE International Conference on Mechatronic and Embedded Systems and Applications (MESA2013)

Portland, Oregon, USA, August 4-7, 2013
http://www.asmeconferences.org/IDETC2013/CallForPapersDetail.cfm

Objectives
Mechanical and electrical systems show an increasing integration of mechanics with electronics and information processing. This integration is between the components (hardware) and the information-driven functions (software), resulting in integrated systems called mechatronic systems. The development of mechatronic systems involves finding an optimal solution that integrates the basic mechanical structure, sensor and actuators, automatic digital information processing and control in which embedded systems play a key role. The goal of the MESA2013 is to bring together experts from the fields of mechatronic and embedded systems, disseminate the recent advances made in the area, discuss future research directions, and exchange research and application experience.

Symposia
* Autonomous Systems and Ambient Intelligence

* Bio-Mechatronics - Medical Devices & Technologies
* Cloud Computing and Emerging Technologies for Mechatronic and Embedded Systems
* Cyber-Physical Systems and Hybrid Systems
* Diagnosis and Monitoring in Mechatronic Systems
* Design and Verification Methodologies for Mechatronic and Embedded Systems
* Embedded Systems Infrastructure and Theory
* Fractional Derivatives and Their Applications (FDTA)
* Mechatronic Control and Electrical Vehicular Systems
* Mechatronic and Embedded Energy Systems
* Mechatronics and Embedded Systems Applications
* Mechatronics and Embedded Systems Education
* Mechatronic and Embedded Technologies in Intelligent Transportation Systems
* Robotics and Mobile Machines
* Sensors and Actuators
* Small Unmanned Aerial Vehicle Technologies and Applications
* Virtual Prototyping in Mechatronics

Paper Submission
Manuscripts shall be no longer than 10 pages and shall adhere to the ASME Author Guidelines. To download Word and LATEX templates, please visit ASME Author Templates page. Papers in PDF format must be submitted to: https://www.asmeconferences.org/IDETC2013.

Important Dates:
Submission of Abstract 01/07/2013
Submission of Full-Length Paper 01/21/2013
Author Notification of Acceptance 03/18/2013
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Mini-Symposium on "Numerical Methods for Fractional Derivative Equations"

in association with "The 5th Asia Pacific Congress on Computational Mechanics & 4th International Symposium on Computational Mechanics"
---- 11-14th Dec. 2013, Singapore, www.apcom2013.org

Call for Papers
The aims of this mini-symposium are to review the progress of diverse numerical methods for fractional derivative governing equations, to seek the exciting work being undertaken in the correlative field, and to promote advanced research, development and applications.

The mini-symposium will provide communications among researchers and practitioners who are interested in this field, introduce new researchers to the field, present original ideas, report state-of-the-art and in-progress research results, discuss future trends and challenges, establish fruitful

contacts, and promote interactions between researchers in numerical fractional derivative equations and those in other cross-disciplines.

The topics of this mini-symposium cover a wide range of numerical methods for fractional partial differential equations, such as finite element, finite volume, finite difference, spectral, mesh-free, matrix, decomposition methods. In particular, we welcome the research with particular application backgrounds regarding acoustics, viscosity, dynamic systems, advection-diffusion, control, geophysics, economics, statistics, just to mention a few.

All abstract (and/or full-paper) submissions should be sent to secretariat@apcom2013.org before 30 Apr. 2013. More conference info can be found at www.apcom2013.org.

Organizer contact: Guofei Pang (Mr.) at pangguofei2008@126.com.

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Call for Paper

Special Issue on Advanced Topics in Fractional Dynamics
In the journal "Advances in Mathematical Physics"

(Contributed by Prof. Changpin Li)
http://mts.hindawi.com/author/submit/journals/amp/fract/

Call for Papers
Fractional order differentiation consists in the generalization of classical integer differentiation to real or complex orders. During the last decades, fractional differentiation has drawn increasing attention in the study of the so-called anomalous social and physical behaviors, where scaling power law of fractional order appears universal as an empirical description of such complex phenomena. The goal of this special issue is to address the latest developments in the area of fractional calculus application in dynamical systems. Papers describing original research work that reflects the recent theoretical advances and experimental results as well as new topics for research are invited on all aspects of object tracking. Potential topics include, but are not limited to:
• Modeling and applications of complex systems in physics, biology, biophysics, and medicine
• Fractional variational principles
• Continuous time random walk
• Computational fractional derivative equations
• Viscoelasticity
• Fractional differential equations

• Fractional operators on fractals
• Local fractional derivatives
• Automatic control
• Thermal systems
• Electromagnetism
• Economical and financial systems
• Electrical, mechanical, and thermal systems
• Bifurcation
• Chaos
• Synchronization

Before submission authors should carefully read over the journal's Author Guidelines, which are located at http://www.hindawi.com/journals/amp/guidelines/. Prospective authors should submit an electronic copy of their complete manuscript through the journal Manuscript
Tracking System at http://mts.hindawi.com/author/submit/journals/amp/fract/ according to the following timetable:

Manuscript Due Friday, 17 May 2013
First Round of Reviews Friday, 9 August 2013
Publication Date Friday, 4 October 2013

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4200-072 Porto, Portugal; jtm@isep.ipp.pt

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Books

Introduction to the Fractional Calculus of Variations

Delfim F M Torres (Author), Agnieszka B Malinowska (Author)

Book Description

This invaluable book provides a broad introduction to the fascinating and beautiful subject of Fractional Calculus of Variations (FCV). In 1996, FVC evolved in order to better describe non-conservative systems in mechanics. The inclusion of non-conservatism is extremely important from the point of view of applications. Forces that do not store energy are always present in real systems. They remove energy from the systems and, as a consequence, Noether's conservation laws cease to be valid. However, it is still possible to obtain the validity of Noether's principle using FCV. The new theory provides a more realistic approach to physics, allowing us to consider non-conservative systems in a natural way. The authors prove the necessary Euler Lagrange conditions and corresponding Noether theorems for several types of fractional variational problems, with and without constraints, using Lagrangian and Hamiltonian formalisms. Sufficient optimality conditions are also obtained under convexity, and Leitmann's direct method is discussed within the framework of FCV. The book is self-contained and unified in presentation. It may be used as an advanced textbook by graduate students and ambitious undergraduates in mathematics and mechanics. It provides an opportunity for an introduction to FCV for experienced researchers. The explanations in the book are detailed, in order to capture the interest of the curious reader, and the book provides the necessary background material required to go further into the subject and explore the rich research literature.

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Fractional Order Motion Controls

Ying Luo (Original Author), YangQuan Chen (Original Author)

Book Description

Covering fractional order theory, simulation and experiments, this book explains how fractional order modelling and fractional order controller design compares favourably with traditional velocity and position control systems. The authors systematically compare the two approaches using applied fractional calculus. Stability theory in fractional order controllers design is also analysed.

• Presents material suitable for a variety of real-world applications, including hard disk drives, vehicular controls, robot control and micropositioners in DNA microarray analysis

• Includes extensive experimental results from both lab bench level tests and industrial level, mass-production-ready implementations

• Covers detailed derivations and numerical simulations for each case

• Discusses feasible design specifications, ideal for practicing engineers

The book also covers key topics including: fractional order disturbance cancellation and adaptive learning control studies for external disturbances; optimization approaches for nonlinear system control and design schemes with backlash and friction. Illustrations and experimental validations are

included for each of the proposed control schemes to enable readers to develop a clear understanding of the approaches covered, and move on to apply them in real-world scenarios.

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Journals

Special Issue of Computers & Mathematics with Applications on Advances in Fractional Differential Equations (III)

Volume 64, Issue 10, Pages 2965-3484, November 2012
(Contributed by Yong Zhou)

Vedat Suat Ertürk, Gul Zaman, Shaher Momani
A numerical approach to the generalized nonlinear fractional Fokker–Planck equation
Zhengang Zhao, Changpin Li
Approximation of fractional integrals by means of derivatives
Shakoor Pooseh, Ricardo Almeida, Delfim F.M. Torres
Weak solutions for hyperbolic partial fractional differential inclusions in Banach spaces
Mouffak Benchohra, Johnny Henderson, Fatima-Zohra Mostefai
The technique of Volterra–Stieltjes integral equations in the application to infinite systems of nonlinear integral equations of fractional orders
Józef Banaś, Beata Rzepka
State variables and transients of fractional order differential systems
J.C. Trigeassou, N. Maamri, J. Sabatier, A. Oustaloup
A second order explicit finite difference method for the fractional advection diffusion equation
Ercília Sousa
The controllability of fractional control systems with control delay
Jiang Wei
Weighted pseudo almost automorphic mild solutions to semilinear fractional differential equations
Yong-Kui Chang, Rui Zhang, G.M. N' Guérékata
Controllability and observability of impulsive fractional linear time-invariant system
Tian Liang Guo
Neumann boundary-value problems for a time-fractional diffusion-wave equation in a half-plane
Yuriy Povstenko
Gronwall's inequality on discrete fractional calculus
Ferhan M. Atıcı, Paul W. Eloe
Relative controllability of fractional dynamical systems with distributed delays in control
K. Balachandran, Yong Zhou, J. Kokila
Iterative learning control with initial state learning for fractional order nonlinear systems
Yong-Hong Lan
Mixed stochastic differential equations with long-range dependen Existence, uniqueness and convergence of solutions
Yuliya Mishura, Georgiy Shevchenko
Nonlinear boundary value problems of fractional functional integro-differential equations
Zhenhai Liu, Jihua Sun
Fractional semilinear differential inclusions
Abdelghani Ouahab
Eigenvalue intervals for a class of fractional boundary value problem
Zhanbing Bai
Robust stability for fractional-order systems with structured and unstructured uncertainties
Zhuang Jiao, Yisheng Zhong
On the solvability of a fractional differential equation model involving the p-Laplacian operator
Xiping Liu, Mei Jia, Xiufen Xiang
On the local well-posedness for the fractional Landau–Lifshitz–Gilbert equation
Xueke Pu
Impulsive problems for fractional differential equations with boundary value conditions

Tian Liang Guo, Jiang Wei
A family of dissipative active scalar equations with singular velocity and measure initial data
Lucas C.F. Ferreira
Fractional electrostatic equations in fractal composite structures
E. Baskin, A. Iomin
Existence and uniqueness of solutions for a coupled system of multi-term nonlinear fractional differential equations
Shurong Sun, Qiuping Li, Yanan Li
Theories of thermal stresses based on space–time-fractional telegraph equations
Yuriy Povstenko
The fractional-order modeling and synchronization of electrically coupled neuron systems
K. Moaddy, A.G. Radwan, K.N. Salama, S. Momani, I. Hashim
The effect of fractional order in variable structure control
J.A. Tenreiro Machado
Generalized fractional calculus with applications to the calculus of variations
Tatiana Odzijewicz, Agnieszka B. Malinowska, Delfim F.M. Torres
Transient chaos in fractional Bloch equations
Sachin Bhalekar, Varsha Daftardar-Gejji, Dumitru Baleanu, Richard Magin
Analytical solutions for the multi-term time-fractional diffusion-wave/diffusion equations in a finite domain
H. Jiang, F. Liu, I. Turner, K. Burrage
Nonlinear impulsive problems for fractional differential equations and Ulam stability
JinRong Wang, Yong Zhou, Michal Fec˘kan
Existence of solutions of abstract fractional integrodifferential equations of Sobolev type
K. Balachandran, S. Kiruthika
Impulsive fractional functional differential equations
Tian Liang Guo, Wei Jiang
Positive solutions to singular boundary value problems for fractional functional differential equations with changing sign nonlinearity
Xinwei Su
Existence of solutions for a fractional boundary value problem via the Mountain Pass method and an iterative technique
Hong-Rui Sun, Quan-Guo Zhang
Coincidence degree and fractional boundary value problems with impulses
Fulai Chen
Existence of positive solutions for nonlinear fractional functional differential equation
Yulin Zhao, Haibo Chen, Li Huang
New stability results for fractional integral equation
Wei Wei, Xuezhu Li, Xia Li
Existence results for fractional order functional differential equations with impulse
Heping Jiang

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Paper Highlight

Fractional sequential mechanics-models with symmetric fractional derivative

Małgorzata Klimek

Publication information: Małgorzata Klimek. Fractional sequential mechanics — models with symmetric fractional derivative. Czechoslovak Journal of Physics, 2001, 51(12), 1348-1354. http://link.springer.com/article/10.1023%2FA%3A1013378221617?LI=true

Abstract
The symmetric fractional derivative is introduced and its properties are studied. The Euler-Lagrange equations for models depending on sequential derivatives of type are derived using minimal action principle. The Hamiltonian for such systems is introduced following methods of classical generalized mechanics and the Hamilton's equations are obtained. It is explicitly shown that models of fractional sequential mechanics are non-conservative. The limiting procedure recovers classical generalized mechanics of systems depending on higher order derivatives. The method is applied to fractional deformation of harmonic oscillator and to the case of classical frictional force proportional to velocity.

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Tempered anomalous diffusion in heterogeneous systems

Mark M. Meerschaert, Yong Zhang, Boris Baeumer

Publication information: Mark M. Meerschaert, Yong Zhang, Boris Baeumer. Tempered anomalous diffusion in heterogeneous systems. Geophysical Research Letters, 2008, 35(17), L17403, doi:10.1029/2008GL034899. http://onlinelibrary.wiley.com/doi/10.1029/2008GL034899/abstract

Abstract
Passive tracers in heterogeneous media experience preasymptotic transport with scale-dependent anomalous diffusion, before eventually converging to the asymptotic diffusion limit. We propose a novel tempered model to capture the slow convergence of sub-diffusion to a diffusion limit for passive tracers in heterogeneous media. Previous research used power-law waiting times to capture the time-nonlocal transport process. Here those waiting times are exponentially tempered, to capture the natural cutoff of retention times. The model is validated against particle concentrations from

detailed numerical simulations and field measurements, at various scales and geological environments.

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Calculus on fractal subsets of real line — I: Formulation

Abhay Parvate, A. D. Gangal

Publication information: Abhay Parvate, A. D. Gangal. Calculus on fractal subsets of real line-I: Formulation. Fractals, 2009, 17(01), DOI: 10.1142/S0218348X09004181.
http://www.worldscientific.com/doi/abs/10.1142/S0218348X09004181

Abstract
A new calculus based on fractal subsets of the real line is formulated. In this calculus, an integral of order α, $0 < \alpha \leq 1$, called F^{α}-integral, is defined, which is suitable to integrate functions with fractal support F of dimension α. Further, a derivative of order α, $0 < \alpha \leq 1$, called Fα-derivative, is defined, which enables us to differentiate functions, like the Cantor staircase, ``changing" only on a fractal set. The F^{α}-derivative is local unlike the classical fractional derivative. The F^{α}-calculus retains much of the simplicity of ordinary calculus. Several results including analogues of fundamental theorems of calculus are proved. The integral staircase function, which is a generalisation of the functions like the Cantor staircase function, plays a key role in this formulation. Further, it gives rise to a new definition of dimension, the \gamma-dimension. F^{α}-differential equations are equations involving F^{α}-derivatives. They can be used to model sublinear dynamical systems and fractal time processes, since sublinear behaviours are associated with staircase-like functions which occur naturally as their solutions. As examples, we discuss a fractal-time diffusion equation, and one dimensional motion of a particle undergoing friction in a fractal medium.

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Calculus on fractal subsets of real line-II: Conjugacy with ordinary calculus

Abhay Parvate, A. D. Gangal

Publication information: Abhay Parvate, A. D. Gangal. Calculus on fractal subsets of real line-II: Conjugacy with ordinary calculus. Fractals, 2011, 19, DOI: 10.1142/S0218348X11005440.
http://www.worldscientific.com/doi/abs/10.1142/S0218348X11005440

Abstract

Calculus on fractals, or F^{α}-calculus, developed in a previous paper, is a calculus based fractals $F \subset R$,

and involves F^{α}-integral and $F\alpha$-derivative of orders α, $0 < \alpha \leq 1$, where α is the dimension of F. The F^{α}-integral is suitable for integrating functions with fractal support of dimension α, while the F^{α}-derivative enables us to differentiate functions like the Cantor staircase. Several results in F^{α}-calculus are analogous to corresponding results in ordinary calculus, such as the Leibniz rule, fundamental theorems, etc. The functions like the Cantor staircase function occur naturally as solutions of F^{α}-differential equations. Hence the latter can be used to model processes involving fractal space or time, which in particular include a class of dynamical systems exhibiting sublinear behaviour.
In this paper we show that, as operators, the F^{α}-integral and F^{α}-derivative are conjugate to the Riemann integral and ordinary derivative respectively. This is accomplished by constructing a map ψ which takes F^{α}-integrable functions to Riemann integrable functions, such that the corresponding integrals on appropriate intervals have equal values. Under suitable conditions, a restriction of ψ also takes F^{α}-differentiable functions to ordinarily differentiable functions such that their values at appropriate points are equal. Further, this conjugacy is generalized to one between Sobolev spaces in ordinary calculus and F^{α}-calculus.
This conjugacy is useful, among other things, to find solutions to F^{α}-differential equations: they can be mapped to ordinary differential equations, and the solutions of the latter can be transformed back to get those of the former. This is illustrated with a few examples.

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Toolbox

FracLab

http://fraclab.saclay.inria.fr/
(Contributed by Jacques Levy-Vehel)

We are pleased to announce the release of version 2.1 of the free software toolbox FracLab.

FracLab is a set of integrated MatLab codes that allows to synthesize, estimate and study deterministic and random fractal and multifractal data in 1D and 2D. Signals with varying local regularity may also be studied. In addition, various tasks in image/signal processing may be

performed (segmentation, denoising, interpolation,...). FracLab comes with a graphical interface that makes its use intuitive.

FracLab may be downloaded at: http://fraclab.saclay.inria.fr/

Comments and feedback are welcome.

Jacques Levy-Vehel
email: jacques.levy.vehel@gmail.com

For details see: **A fractal analysis toolbox for signal and image processing**
(From http://fraclab.saclay.inria.fr/)

FracLab is a general purpose signal and image processing toolbox based on fractal and multifractal methods.
FracLab can be approached from two different perspectives:
Fractal analysis: A large number of procedures allow to compute various fractal quantities associated with 1D or 2D signals, such as dimensions, Holder exponents or multifractal spectra.
Signal processing: Alternatively, one can use FracLab directly to perform many basic tasks in signal processing, including estimation, detection, denoising, modelling, segmentation,classification, and synthesis.
Note that FracLab is not intended to process "fractal" signals (whatever meaning is given to this word), but rather to apply fractal tools to the study of irregular but otherwise arbitrary signals.
A graphical interface makes FracLab easy to use and intuitive. In addition, various wavelet-related tools are available in FracLab.

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The End of This Issue