Conference

Invitation for ICF13 Session 49: Soft Matter/Materials

Fractional dynamical systems and signals

Latest SCI Journal Papers on FDA

October 2012

Books

Introduction to the Fractional Calculus of Variations

Fractal Geometry, Complex Dimensions and Zeta Functions

Journals

Fractional Calculus & Applied Analysis

International Journal of Bifurcation and Chaos (IJBC)

Chaos, Solitons & Fractals

Classical Papers

Applications of fractional calculus to dynamic problems of linear and nonlinear hereditary mechanics of solids

Fractional calculus and continuous-time finance II: the waiting-time distribution
The 13th International Conference on Fracture (ICF13) will be held in Beijing, China on June 16–21, 2013. This conference is a continuation of the very successful cosmopolitan series of quadrennial conferences. Below is its website:

http://www.icf13.org/

ICF13 is dedicated to the development and innovation in not only the traditional and fundamental topics but also the exciting and edge-cutting arenas—from biomedicine to geophysics, from nano/atomic to macro scales, and from physical to holistic and system modeling.

Here I invite you to contribute an abstract to

Session 49: Soft Matter/Materials

Please noted that the deadline for abstract is the 17th October.

Many thanks for your participation and contribution. We look forward to meeting you at the conference.

Fractional dynamical systems and signals

-----A special session in European Control Conference 2013

http://www.ecc13.ch/
Call for Papers

The goal of this special session is to gather colleagues that work in the field of fractional calculus in order to present the latest results in fractional dynamical systems and signals domain. Papers describing original research work that reflects the recent theoretical advances and experimental results as well as open new issues for research are invited.

This session will cover the following topics (but not limited to):

- Signal analysis and filtering with fractional tools (restoration, reconstruction, analysis of fractal noises,
- Fractional modeling especially of (but not limited to) thermal systems, electrical systems (motors, transformers, skin effect, …), dielectric materials, electrochemical systems (batteries, ultracapacitors, fuel cells, …), mechanical systems (vibration insulation, viscoelastic materials, …), Biological systems (muscles, lungs, …)
- System identification (linear, non linear, MIMO methods, …)
- Systems implementation (fractional controllers and filters implementation, …)
- Systems analysis (Stability, observability, controllability, …)
- Observers
- Control (Fractional PID, CRONE, $H\infty$, …)
- Diagnosis of fractional systems

Submission Deadline: Contributed Papers and special issues must be submitted before October 19, 2012.

Submission Guidelines

Prepare our papers according to recommendations available at

http://www.ecc13.ch/call.html

Contact if you intend to participate

Jocelyn Sabatier
IMS/LAPS: Automatique, Productique, Signal et Image
Université Bordeaux1 - IPB -UMR 5218 CNRS
Bat A4 - 351, Cours de la Libération
33405 Talence Cedex, France
Email: jocelyn.sabatier@u-bordeaux1.fr
Latest SCI Journal Papers on FDA

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from ISI Web of Science (SCI)

1. Title: Chaos and hyperchaos in fractional-order cellular neural networks
   Author(s): Huang, Xia; Zhao, Zhao; Wang, Zhen; et al.

2. Title: Approximate analytical solutions of Schnakenberg systems by homotopy analysis method
   Author(s): Arafa, A. A. M.; Rida, S. Z.; Mohamed, H.

3. Title: A new Jacobi operational matrix: An application for solving fractional differential equations
   Author(s): Doha, E. H.; Bhrawy, A. H.; Ezz-Eldien, S. S.

4. Title: Analytical and numerical methods for the stability analysis of linear fractional delay differential equations
   Author(s): Kaslik, Eva; Sivasundaram, Seenith
   Source: JOURNAL OF COMPUTATIONAL AND APPLIED MATHEMATICS Volume: 236 Issue: 16 Special Issue: SI Pages: 4027-4041 DOI: 10.1016/j.cam.2012.03.010 Published: OCT 2012

5. Title: Non-fragile nonlinear fractional order observer design for a class of nonlinear fractional order systems
   Author(s): Boroujeni, Elham Amini; Momeni, Hamid Reza

6. Title: Numerical solution of fractional differential equations using cubic B-spline wavelet collocation method
   Author(s): Li, Xinxiu
   Source: COMMUNICATIONS IN NONLINEAR SCIENCE AND NUMERICAL SIMULATION Volume: 17 Issue: 10 Pages: 3934-3946 DOI: 10.1016/j.cnsns.2012.02.009 Published: OCT 2012
Books

Introduction to the Fractional Calculus of Variations

Agnieszka B Malinowska and Delfim F M Torres

http://www.worldscientific.com/worldscibooks/10.1142/p871

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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• The Classical Calculus of Variations
• Fractional Calculus of Variations via Riemann–Liouville Operators
• Fractional Calculus of Variations via Caputo Operators
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• Towards a Combined Fractional Mechanics and Quantization

Fractal Geometry, Complex Dimensions and Zeta Functions

Michel L. Lapidus and Machiel van Frankenhuijsen


• The Riemann hypothesis is given a natural geometric reformulation in the context of vibrating fractal strings
• Number theory, spectral geometry, and fractal geometry are interlinked in this in-depth study of the vibrations
  of fractal strings, that is, one-dimensional drums with fractal boundary
• Numerous theorems, examples, remarks and illustrations enrich the text
Number theory, spectral geometry, and fractal geometry are interlinked in this in-depth study of the vibrations of
fractal strings; that is, one-dimensional drums with fractal boundary. This second edition of Fractal Geometry,
Complex Dimensions and Zeta Functions will appeal to students and researchers in number theory, fractal geometry,
dynamical systems, spectral geometry, complex analysis, distribution theory, and mathematical physics. The
significant studies and problems illuminated in this work may be used in a classroom setting at the graduate level.
Key Features include:
• The Riemann hypothesis is given a natural geometric reformulation in the context of vibrating fractal strings
• Complex dimensions of a fractal string are studied in detail, and used to understand the oscillations intrinsic to
  the corresponding fractal geometries and frequency spectra
• Explicit formulas are extended to apply to the geometric, spectral, and dynamical zeta functions associated
  with a fractal
• Examples of such explicit formulas include a Prime Orbit Theorem with error term for self-similar flows, and
  a geometric tube formula
• The method of Diophantine approximation is used to study self-similar strings and flows
• Analytical and geometric methods are used to obtain new results about the vertical distribution of zeros of
number-theoretic and other zeta functions

The unique viewpoint of this book culminates in the definition of fractality as the presence of nonreal complex dimensions. The final chapter (13) is new to the second edition and discusses several new topics, results obtained since the publication of the first edition, and suggestions for future developments in the field.

Review of the First Edition:
"The book is self contained, the material organized in chapters preceded by an introduction and finally there are some interesting applications of the theory presented. The book is very well written and organized and the subject is very interesting and actually has many applications."
—Nicolae-Adrian Secelean, Zentralblatt

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Journals

Fractional Calculus & Applied Analysis

Vol. 15, No 4 (2012)
Editorial: FCAA RELATED MEETINGS, BOOKS, IN MEMORIAM (FCAA - Volume 15 - No 4)

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THE DERIVATION OF THE GENERALIZED FUNCTIONAL EQUATIONS DESCRIBING SELF-SIMILAR
International Journal of Bifurcation and Chaos (IJBC) in Applied Sciences and Engineering

Volume 22, Number 8
http://www.worldscientific.com/worldscinet/ijbc

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Classical Papers

Applications of fractional calculus to dynamic problems of linear and nonlinear hereditary mechanics of solids

Yuriy A. Rossikhin and Marina V. Shitikova
http://dx.doi.org/10.1115/1.3101682

Abstract: The aim of this review article is to collect together separated results of research in the application of fractional derivatives and other fractional operators to problems connected with vibrations and waves in solids having hereditarily elastic properties, to make critical evaluations, and thereby to help mechanical engineers who use fractional derivative models of solids in their work. Since the fractional derivatives used in the simplest
viscoelastic models (Kelvin-Voigt, Maxwell, and standard linear solid) are equivalent to the weakly singular kernels of the hereditary theory of elasticity, then the papers wherein the hereditary operators with weakly singular kernels are harnessed in dynamic problems are also included in the review. Merits and demerits of the simplest fractional calculus viscoelastic models, which manifest themselves during application of such models in the problems of forced and damped vibrations of linear and nonlinear hereditarily elastic bodies, propagation of stationary and transient waves in such bodies, as well as in other dynamic problems, are demonstrated with numerous examples. As this takes place, a comparison between the results obtained and the results found for the similar problems using viscoelastic models with integer derivatives is carried out. The methods of Laplace, Fourier and other integral transforms, the approximate methods based on the perturbation technique, as well as numerical methods are used as the methods of solution of the enumerated problems.

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**Fractional calculus and continuous-time finance II: the waiting-time distribution**

Francesco Mainardi, Marco Raberto, Rudolf Gorenflo, Enrico Scalas


**Abstract:** We complement the theory of tick-by-tick dynamics of financial markets based on a continuous-time random walk (CTRW) model recently proposed by Scalas et al. (Physica A 284 (2000) 376), and we point out its consistency with the behaviour observed in the waiting-time distribution for BUND future prices traded at LIFFE, London.

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The End of This Issue