FDA Express Vol. 4, No. 5, Sep. 15, 2012

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Polynomial operators, stieltjes convolution, and fractional calculus in hereditary mechanics

Analysis of four-parameter fractional derivative model of real solid materials

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Latest SCI Journal Papers on FDA

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from ISI Web of Science (SCI)

1. Title: Invariant analysis of time fractional generalized Burgers and Korteweg-de Vries equations
Author(s): Sahadevan, R.; Bakkyaraj, T.
Source: JOURNAL OF MATHEMATICAL ANALYSIS AND APPLICATIONS Volume: 393 Issue: 2 Pages: 341-347 DOI: 10.1016/j.jmaa.2012.04.006 Published: SEP 15 2012

2. Title: Space-time fractional diffusion on bounded domains
Author(s): Chen, Zhen-Qing; Meerschaert, Mark M.; Nane, Erkan
Source: JOURNAL OF MATHEMATICAL ANALYSIS AND APPLICATIONS Volume: 393 Issue: 2 Pages: 479-488 DOI: 10.1016/j.jmaa.2012.04.032 Published: SEP 15 2012

3. Title: CONTINUOUS-TIME FINANCE AND THE WAITING TIME DISTRIBUTION: MULTIPLE CHARACTERISTIC TIMES
Author(s): Fa, Kwok Sau
Source: MODERN PHYSICS LETTERS B Volume: 26 Issue: 23 Article Number: 1250151 DOI: 10.1142/S0217984912501515 Published: SEP 10 2012

4. Title: Fractional optimal control of distributed systems in spherical and cylindrical coordinates
Author(s): Hasan, M. Mehedi; Tangpong, Xiangqing W.; Agrawal, Om Prakash
Source: JOURNAL OF VIBRATION AND CONTROL Volume: 18 Issue: 10 Pages: 1506-1525 DOI: 10.1177/1077546311408471 Published: SEP 2012

5. Title: Fractional order sliding-mode control based on parameters auto-tuning for velocity control of permanent magnet synchronous motor
Author(s): Zhang, BiTao; Pi, YouGuo; Luo, Ying
Source: ISA TRANSACTIONS Volume: 51 Issue: 5 Pages: 649-656 DOI: 10.1016/j.isatra.2012.04.006 Published: SEP 2012

6. Title: Fractional differential inclusions with fractional separated boundary conditions
Author(s): Ahmad, Bashir; Ntouyas, Sotiris K.
Source: FRACTIONAL CALCULUS AND APPLIED ANALYSIS Volume: 15 Issue: 3 Pages: 362-382 DOI: 10.2478/s13540-012-0027-y Published: SEP 2012

7. Title: Towards a combined fractional mechanics and quantization

Author(s): Malinowska, Agnieszka B.; Torres, Delfim F. M.
Source: FRACTIONAL CALCULUS AND APPLIED ANALYSIS Volume: 15 Issue: 3 Pages: 407-417 DOI: 10.2478/s13540-012-0029-9 Published: SEP 2012

8. Title: Anti-periodic fractional boundary value problems with nonlinear term depending on lower order derivative
Author(s): Ahmad, Bashir; Nieto, Juan J.
Source: FRACTIONAL CALCULUS AND APPLIED ANALYSIS Volume: 15 Issue: 3 Pages: 451-462 DOI: 10.2478/s13540-012-0032-1 Published: SEP 2012

9. Title: Uniqueness of positive solutions of fractional boundary value problems with non-homogeneous integral boundary conditions
Author(s): Graef, John R.; Kong, Lingju; Kong, Qingkai; et al.
Source: FRACTIONAL CALCULUS AND APPLIED ANALYSIS Volume: 15 Issue: 3 Pages: 509-528 DOI: 10.2478/s13540-012-0036-x Published: SEP 2012

10. Title: Design of analog variable fractional order differentiator and integrator
Author(s): Charef, Abdelfatah; Idiou, Daoud
Source: NONLINEAR DYNAMICS Volume: 69 Issue: 4 Pages: 1577-1588 DOI: 10.1007/s11071-012-0370-x Published: SEP 2012

11. Title: Adaptive fuzzy H-infinity tracking design of SISO uncertain nonlinear fractional order time-delay systems
Author(s): Lin, Tsung-Chih; Kuo, Chia-Hao; Lee, Tun-Yuan; et al.
Source: NONLINEAR DYNAMICS Volume: 69 Issue: 4 Pages: 1639-1650 DOI: 10.1007/s11071-012-0375-5 Published: SEP 2012

12. Title: Statements on chaos control designs, including a fractional order dynamical system, applied to a "MEMS" comb-drive actuator
Author(s): Tusset, A. M.; Balthazar, J. M.; Bassinello, D. G.; et al.
Source: NONLINEAR DYNAMICS Volume: 69 Issue: 4 Pages: 1837-1857 DOI: 10.1007/s11071-012-0390-6 Published: SEP 2012

13. Title: Nonlinear state-observer control for projective synchronization of a fractional-order hyperchaotic system
Author(s): Liu, Ling; Liang, Deliang; Liu, Chongxin
Source: NONLINEAR DYNAMICS Volume: 69 Issue: 4 Pages: 1929-1939 DOI: 10.1007/s11071-012-0397-z Published: SEP 2012

14. Title: Dynamics analysis and hybrid function projective synchronization of a new chaotic system
Author(s): Wu, Xiangjun; Li, Shanzhi
Source: NONLINEAR DYNAMICS Volume: 69 Issue: 4 Pages: 1979-1994 DOI: 10.1007/s11071-012-0401-7 Published: SEP 2012

15. Title: Master-slave chaos synchronization via optimal fractional order (PID mu)-D-lambda controller with bacterial foraging algorithm
Author(s): Das, Saptarshi; Pan, Indranil; Das, Shantanu; et al.
Source: NONLINEAR DYNAMICS Volume: 69 Issue: 4 Pages: 2193-2206 DOI: 10.1007/s11071-012-0419-x Published: SEP 2012

16. Title: Synchronization between fractional-order Ravinovich-Fabrikant and Lotka-Volterra systems
Author(s): Agrawal, S. K.; Srivastava, M.; Das, S.
Source: NONLINEAR DYNAMICS Volume: 69 Issue: 4 Pages: 2277-2288 DOI: 10.1007/s11071-012-0426-y Published: SEP 2012

17. Title: Analysis of differential equations of fractional order
Author(s): Sayevand, K.; Golbabai, A.; Yildirim, Ahmet
Source: APPLIED MATHEMATICAL MODELLING Volume: 36 Issue: 9 Pages: 4356-4364 DOI: 10.1016/j.apm.2011.11.061 Published: SEP 2012

18. Title: Resolvents for weakly singular kernels and fractional differential equations
Author(s): Becker, Leigh C.
Source: NONLINEAR ANALYSIS-THEORY METHODS & APPLICATIONS Volume: 75 Issue: 13 Pages: 4839-4861 DOI: 10.1016/j.na.2012.04.001 Published: SEP 2012

19. Title: A conformal mapping based fractional order approach for sub-optimal tuning of PID controllers with guaranteed dominant pole placement
Author(s): Saha, Suman; Das, Saptarshi; Das, Shantanu; et al.
Source: COMMUNICATIONS IN NONLINEAR SCIENCE AND NUMERICAL SIMULATION Volume: 17 Issue: 9 Pages: 3628-3642 DOI: 10.1016/j.cnsns.2012.01.007 Published: SEP 2012

20. Title: Sensitivity analysis of CRA based controllers in fractional order systems
Author(s): Tabatabaei, Mohammad; Haeri, Mohammad
Source: SIGNAL PROCESSING Volume: 92 Issue: 9 Pages: 2040-2055 DOI: 10.1016/j.sigpro.2012.01.014 Published: SEP 2012

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Books

Fractional Derivatives for Physicists and Engineers

-------Volume I Background and Theory; Volume II Applications

Vladimir V. Uchaikin

http://www.springer.com/physics/theoretical%2C+mathematical+%26+computational+physics/book/978-3-642-33910-3

- First book combining a clear introduction to the fractional calculus with the description of a wide sphere of physical applications
- Combined ease of access and breadth of scope
- Enables readers to apply the new methods in their own research

The first derivative of a particle coordinate means its velocity, the second means its acceleration, but what does a fractional order derivative mean? Where does it come from, how does it work, where does it lead to? The two-volume book written on high didactic level answers these questions. Fractional Derivatives for Physicists and Engineers— The first volume contains a clear introduction into such a modern branch of analysis as the fractional calculus. The second develops a wide panorama of applications of the fractional calculus to various physical problems. This book recovers new perspectives in front of the reader dealing with turbulence and semiconductors, plasma and thermodynamics, mechanics and quantum optics, nanophysics and astrophysics.

The book is addressed to students, engineers and physicists, specialists in theory of probability and statistics, in mathematical modeling and numerical simulations, to everybody who doesn't wish to stay apart from the new mathematical methods becoming more and more popular.

Prof. Vladimir V. UCHAIKIN is a known Russian scientist and pedagogue, a Honored Worker of Russian High School, a member of the Russian Academy of Natural Sciences. He is the author of about three hundreds articles and more than a dozen books (mostly in Russian) in Cosmic ray physics, Mathematical physics, Levy stable statistics, Monte Carlo methods with applications to anomalous processes in complex systems of various levels: from quantum dots to the Milky Way galaxy.

Keywords: Applications Fractional derivatives - Fractals physics - Hereditarity - Stable statistics

Related subjects: Computational Science & Engineering - Physical & Information Science - Theoretical, Mathematical & Computational Physics

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Selected Aspects of Fractional Brownian Motion

Ivan Nourdin

http://www.springer.com/mathematics/probability/book/978-88-470-2822-7

- Except for very few exception, every result stated in this book is proved in details: the book is then perfectly tailored for self-learning
- My guiding thread was to develop only the most aesthetic topics related to fractional Brownian motion: the book will appeal to readers who are not necessarily familiar with fractional Brownian motion and who like beautiful mathematics
- A special chapter on a recent link between fractional Brownian motion and free probability introduces the reader to a new and promising line of research

Fractional Brownian motion (fBm) is a stochastic process which deviates significantly from Brownian motion and semimartingales, and others classically used in probability theory. As a centered Gaussian process, it is characterized by the stationarity of its increments and a medium- or long-memory property which is in sharp contrast with martingales and Markov processes. FBm has become a popular choice for applications where classical processes cannot model these non-trivial properties; for instance long memory, which is also known as persistence, is of fundamental importance for financial data and in internet traffic. The mathematical theory of fBm is currently being developed vigorously by a number of stochastic analysts, in various directions, using complementary and sometimes competing tools. This book is concerned with several aspects of fBm, including the stochastic integration with respect to it, the study of its supremum and its appearance as limit of partial sums involving stationary sequences, to name but a few. The book is addressed to researchers and graduate students in probability and mathematical statistics. With very few exceptions (where precise references are given), every stated result is proved.

Content Level: Research
Keywords: Fractional Brownian motion - Integration - Limit theorems - Malliavin calculus - Maximum of Gaussian processes
Related subjects: Probability Theory and Stochastic Processes - Quantitative Finance

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An Interdisciplinary Journal of Discontinuity, Nonlinearity, and Complexity

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N. Yousfi, P. Melchior, C. Rekik, N. Derbe, A. Oustaloup

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A semi-analytical method for the computation of the Lyapunov exponents of fractional-order systems
Riccardo Caponetto, Stefano Fazzino

Generalized anti-periodic boundary value problems of impulsive fractional differential equations
Xiaoping Li, Fulai Chen, Xuezhu Li

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Wave propagation in nonlocal elastic continua modelled by a fractional calculus approach
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Classical Papers

Polynomial operators, stieltjes convolution, and fractional calculus in hereditary mechanics

R.C. Koeller

Publication information: R.C. Koeller. Polynomial operators, stieltjes convolution, and fractional calculus in hereditary mechanics. ACTA MECHANICA, 58 3-4 (1986), 251-264, DOI: 10.1007/BF01176603. http://www.springerlink.com/content/lt2p66kw30680171/

Abstract

Fractional calculus is used to describe the general behavior of materials with memory. An expression for the fractional derivative or the fractional integral is developed in terms of the Stieltjes convolution

and the Riesz distribution. The general fractional calculus polynomial operator constitutive equation is reduced to a Stieltjes convolution. A constitutive equation which depends on a memory parameter for an isotorpic viscoelastic material is presented. The proposed creep compliance has an initial response, a primary creep region, a secondary creep region and a tertiary creep region. The corresponding relaxation modulus has a glassy region, a leathery region, a rubbery region and a liquid region.

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Analysis of four-parameter fractional derivative model of real solid materials

T. Pritz

Publication information: T. Pritz. Analysis of four-parameter fractional derivative model of real solid materials. Journal of Sound and Vibration, 195(1) (1996) :103 – 115. http://www.sciencedirect.com/science/article/pii/S0022460X9690406X

Abstract

The introduction of fractional derivatives into the constitutive equation of the differential operator type of linear solid materials has led to the development of the so-called fractional derivative models. One of these models, characterized by four parameters, has been found usable for describing the variation of dynamics elastic and damping properties in a wide frequency range, provided that there is only one loss peak. In this paper this four-parameter model is theoretically analyzed. The effect of the parameters on the frequency curves is demonstrated, and it is shown that there is a strict relation between the dispersion of the dynamic modulus, the loss peak and the slope of the frequency curves. The half-value bandwidth of the loss modulus frequency curve is investigated, and conditions are developed to establish the applicability of the model for a class of materials. Moreover, it is shown that the model can be used to predict the frequency dependences of dynamic properties for a wide range even if measurements are made in only a narrow frequency range around the loss peak.

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