

Fractional Dynamics Applications Of Fractional Calculus To Dynamics Of Particles Fields And Media Nonlinear Physical Science

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Fractional Dynamics Applications of Fractional Calculus to Dynamics of Particles, Fields and Media N ~~Fractional Calculus and Fractal Dynamics (with some applications) The Fractional Derivative, what is it? | Introduction to Fractional Calculus~~

~~fractional calculus definition, history importance and application Viscoelasticity and Fractional Derivatives #ElevatingMath Soft matters and fractional calculus the variable order fractional dynamics (Part C) Soft matters and fractional calculus the variable order fractional dynamics (Part B) Functional Fractional Calculus Fractional Differential Equations and Applications : Gunvant A Birajdar Mamikon Gulian on Fractional Calculus \u0026 Hidden Physics Fractional Differential and Integral Calculus - part 1 Fractional Calculus: A New Language for Explaining Complex Crowd Behavior Fractional Parts of a Set Trigonometry Song | Maths Song | Mathematics Song | Mathematicspi-th derivative of x^π What Is The Factorial Of 1/2? SURPRISING $(1/2)! = (\pi)/2$ Half Derivative Definition Fractional order derivative of a function \u0026 fractional numbers' factorial. Fractions with Exponents | Powers of Fractions (FC07) The Riemann-Liouville Fractional Integral Imaginary derivative of x Half derivative of 1 Fractional Calculus Step by Step Some tools to study random fractional differential equations and applications Fractional Calculus Workshop 09-10 June 2020 Applications of analysis to fractional differential equations Generalized Fractional Calculus and the Application to Oscillator Equations - Yufeng Xu~~

~~Fractional calculus PART 2 - solution to the one-half order differential equation Theory and Applications of Special Functions and Fractional Calculus Getting the most out of fractional models Fractional Dynamics Applications Of Fractional~~

About this book. "Fractional Dynamics: Applications of Fractional Calculus to Dynamics of Particles, Fields and Media" presents applications of fractional calculus, integral and differential equations of non-integer orders in describing systems with long-time memory, non-local spatial and fractal properties. Mathematical models of fractal media and distributions, generalized dynamical systems and discrete maps, non-local statistical mechanics and kinetics, dynamics of open quantum systems ...

Fractional Dynamics - Applications of Fractional Calculus ...

Abstract "Fractional Dynamics: Applications of Fractional Calculus to Dynamics of Particles, Fields and Media" presents applications of fractional calculus, integral and differential equations of...

(PDF) Fractional Dynamics: Application of Fractional ...

Buy Fractional Dynamics: Applications of Fractional Calculus to Dynamics of Particles, Fields and Media (Nonlinear Physical Science) 1st Edition. by Tarasov, Vasily E. (ISBN: 9783642140020) from Amazon's Book Store. Everyday low prices and free delivery on eligible orders.

Fractional Dynamics: Applications of Fractional Calculus ...

Fractional Dynamics: Application of Fractional Calculus to Dynamics of Particles, Fields and Media

(PDF) Fractional Dynamics: Application of Fractional ...

Introduction. "Fractional Dynamics: Applications of Fractional Calculus to Dynamics of Particles, Fields and Media" presents applications of fractional calculus, integral and differential equations of non-integer orders in describing systems with long-time memory, non-local spatial and fractal properties. Mathematical models of fractal media and distributions, generalized dynamical systems and discrete maps, non-local statistical mechanics and kinetics, dynamics of open quantum systems, the ...

Fractional Dynamics | SpringerLink

The present state-of-the-art article is devoted to the analysis of new trends and recent results carried out during the last 10 years in the field of fractional calculus application to dynamic problems of solid mechanics. This review involves the papers dealing with study of dynamic behavior of linear and nonlinear 1DOF systems, systems with two and more DOFs, as well as linear and nonlinear ...

Application of Fractional Calculus for Dynamic Problems of ...

7.4. Application of fractional derivative model to sediment bed-load transport. In recent years, it has been found that anomalous diffusion exists in the process of bed-load transport. Bed sediment transport in rivers is scale dependent, with anomalous and Fickian scaling dominate at different scales.

A new collection of real world applications of fractional ...

The most straightforward application of fractional-derivative models in solid Earth dynamics might be mass transport. Mass movement, also called mass wasting or landslide, refers to the downslope movement of mud, regolith (i.e., soil, sediment, and debris), rock, or snow/ice under gravity . Mass movement plays a critical role in the rock cycle, affecting landscape evolution and producing stream valleys

when mixed with running water.

A review of applications of fractional calculus in Earth ...

In Section 2, it is presented the application of FC concepts to the tuning of PID controllers and, in Section 3, the application of a fractional-order PD controller in the control of the leg joints of a hexapod robot. Then in Section 4, it is presented the fractional dynamics in the trajectory control of redundant manipulators.

Some Applications of Fractional Calculus in Engineering

fractional dynamics applications of fractional calculus to dynamics of particles fields and media nonlinear physical science Sep 08, 2020 Posted By Eleanor Hibbert Library TEXT ID f12412d9c Online PDF Ebook Epub Library left in stock order soon the motion of a dislocation through a lattice is a quintessential nonlinear dynamics problem that involves the evolution of nonlinear particle

Fractional Dynamics Applications Of Fractional Calculus To ...

Fractional Models and their Applications Boundedness and Lagrange stability of fractional order perturbed system related to unperturbed systems with initial time difference in Caputo's sense In this paper, we have investigated that initial time difference boundedness criteria and Lagrange stability for fractional order differential equation in Caputo's sense are unified with Lyapunov-like function...

Fractional models and their applications

Fractional dynamics basically investigates the behavior and time evolution of mathematical objects through integrations and differentiation of fractional (i.e. non-integer) orders. The main interest of this special issue is to describe and analyze new methods and techniques for solving nonlinear dynamical systems described by fractional differential equations.

Call for Papers - Advanced Computational Fractional ...

Editorial Operators of Fractional Calculus and Their Applications Hari Mohan Srivastava 1,2 1 Department of Mathematics and Statistics, University of Victoria, Victoria, BC V8W 3R4, Canada; harimsri@math.uvic.ca 2 Department of Medical Research, China Medical University Hospital, China Medical University, Taichung 40402, Taiwan Received: 4 September 2018; Accepted: 4 September 2018; Published ...

Operators of Fractional Calculus and Their Applications

In the fields of dynamical systems and control theory, a fractional-order system is a dynamical system that can be modeled by a fractional differential equation containing derivatives of non-integer order. Such systems are said to have fractional dynamics. Derivatives and integrals of fractional orders are used to describe objects that can be characterized by power-law nonlocality, power-law long-range dependence or fractal properties. Fractional-order systems are useful in studying the anomalou

Fractional-order system - Wikipedia

Fractional Dynamics Applications of Fractional Calculus to Dynamics of Particles, Fields and Media; pp.457-466; Vasily Tarasov. In the quantum mechanics, the observables are given by self-adjoint ...

Fractional Dynamics - researchgate.net

The fractional order calculus (FOC) is as old as the integer one although up to recently its application was exclusively in mathematics. Many real systems are better described with FOC differential equations as it is a well-suited tool to analyze problems of fractal dimension, with long-term "memory" and chaotic behavior.

Fractional Order Calculus: Basic Concepts and Engineering ...

Fractional Dynamics: Applications of Fractional Calculus to Dynamics of Particles, Fields and Media: Tarasov, Vasily E: Amazon.nl Selecteer uw cookievoorkeuren We gebruiken cookies en vergelijkbare tools om uw winkelervaring te verbeteren, onze services aan te bieden, te begrijpen hoe klanten onze services gebruiken zodat we verbeteringen kunnen aanbrengen, en om advertenties weer te geven.

Fractional Dynamics: Applications of Fractional Calculus ...

Dumitru's research interests include fractional dynamics and its applications, fractional differential equations, dynamic systems on time scales, Hamilton-Jacobi formalism, Lie symmetries. He has published more than 600 papers indexed in SCI. He is one of the editors of 5 books published by Springer, one published by AIP Conference Proceedings ...

"Fractional Dynamics: Applications of Fractional Calculus to Dynamics of Particles, Fields and Media" presents applications of fractional calculus, integral and differential equations of non-integer orders in describing systems with long-time memory, non-local spatial and fractal properties. Mathematical models of fractal media and distributions, generalized dynamical systems and discrete maps, non-local statistical mechanics and kinetics, dynamics of open quantum systems, the hydrodynamics and electrodynamics of complex media with non-local properties and memory are considered. This book is intended to meet the needs of scientists and graduate students in physics, mechanics and applied mathematics who are interested in electrodynamics, statistical and condensed matter physics, quantum dynamics, complex media theories and kinetics, discrete maps and lattice models, and nonlinear dynamics and chaos. Dr. Vasily E. Tarasov is a Senior Research Associate at Nuclear Physics Institute of Moscow State

University and an Associate Professor at Applied Mathematics and Physics Department of Moscow Aviation Institute.

The book is devoted to recent developments in the theory of fractional calculus and its applications. Particular attention is paid to the applicability of this currently popular research field in various branches of pure and applied mathematics. In particular, the book focuses on the more recent results in mathematical physics, engineering applications, theoretical and applied physics as quantum mechanics, signal analysis, and in those relevant research fields where nonlinear dynamics occurs and several tools of nonlinear analysis are required. Dynamical processes and dynamical systems of fractional order attract researchers from many areas of sciences and technologies, ranging from mathematics and physics to computer science.

Fractional Dynamics and Control provides a comprehensive overview of recent advances in the areas of nonlinear dynamics, vibration and control with analytical, numerical, and experimental results. This book provides an overview of recent discoveries in fractional control, delves into fractional variational principles and differential equations, and applies advanced techniques in fractional calculus to solving complicated mathematical and physical problems. Finally, this book also discusses the role that fractional order modeling can play in complex systems for engineering and science.

Fractional-order calculus dates to the 19th century but has been resurrected as a prevalent research subject due to its provision of more adequate and realistic descriptions of physical aspects within the science and engineering fields. What was once a classical form of mathematics is currently being reintroduced as a new modeling technique that engineers and scientists are finding modern uses for. There is a need for research on all facets of these fractional-order systems and studies of its potential applications. Advanced Applications of Fractional Differential Operators to Science and Technology provides emerging research exploring the theoretical and practical aspects of novel fractional modeling and related dynamical behaviors as well as its applications within the fields of physical sciences and engineering. Featuring coverage on a broad range of topics such as chaotic dynamics, ecological models, and bifurcation control, this book is ideally designed for engineering professionals, mathematicians, physicists, analysts, researchers, educators, and students seeking current research on fractional calculus and other applied mathematical modeling techniques.

Introduces Novel Applications for Solving Neutron Transport Equations While deemed nonessential in the past, fractional calculus is now gaining momentum in the science and engineering community. Various disciplines have discovered that realistic models of physical phenomenon can be achieved with fractional calculus and are using them in numerous ways. Since fractional calculus represents a reactor more closely than classical integer order calculus, Fractional Calculus with Applications for Nuclear Reactor Dynamics focuses on the application of fractional calculus to describe the physical behavior of nuclear reactors. It applies fractional calculus to incorporate the mathematical methods used to analyze the diffusion theory model of neutron transport and explains the role of neutron transport in reactor theory. The author discusses fractional calculus and the numerical solution for fractional neutron point kinetic equation (FNPKE), introduces the technique for efficient and accurate numerical computation for FNPKE with different values of reactivity, and analyzes the fractional neutron point kinetic (FNPKE) model for the dynamic behavior of neutron motion. The book begins with an overview of nuclear reactors, explains how nuclear energy is extracted from reactors, and explores the behavior of neutron density using reactivity functions. It also demonstrates the applicability of the Haar wavelet method and introduces the neutron diffusion concept to aid readers in understanding the complex behavior of average neutron motion. This text: Applies the effective analytical and numerical methods to obtain the solution for the NDE Determines the numerical solution for one-group delayed neutron FNPKE by the explicit finite difference method Provides the numerical solution for classical as well as fractional neutron point kinetic equations Proposes the Haar wavelet operational method (HWOM) to obtain the numerical approximate solution of the neutron point kinetic equation, and more Fractional Calculus with Applications for Nuclear Reactor Dynamics thoroughly and systematically presents the concepts of fractional calculus and emphasizes the relevance of its application to the nuclear reactor.

This book gives a realistic contemporary image of Hamiltonian dynamics, dealing with the basic principles of the Hamiltonian theory of chaos in addition to very recent and unusual applications of nonlinear dynamics and the fractality of dynamics.

This work aims to present, in a systematic manner, results including the existence and uniqueness of solutions for the Cauchy Type and Cauchy problems involving nonlinear ordinary fractional differential equations.

Fractional calculus is a collection of relatively little-known mathematical results concerning generalizations of differentiation and integration to noninteger orders. While these results have been accumulated over centuries in various branches of mathematics, they have until recently found little appreciation or application in physics and other mathematically oriented sciences. This situation is beginning to change, and there are now a growing number of research areas in physics which employ fractional calculus. This volume provides an introduction to fractional calculus for physicists, and collects easily accessible review articles surveying those areas of physics in which applications of fractional calculus have recently become prominent. Contents: An Introduction to Fractional Calculus (P L Butzer & U Westphal) Fractional Time Evolution (R Hilfer) Fractional Powers of Infinitesimal Generators of Semigroups (U Westphal) Fractional Differences, Derivatives and Fractal Time Series (B J West & P Grigolini) Fractional Kinetics of Hamiltonian Chaotic Systems (G M Zaslavsky) Polymer Science Applications of Path-Integration, Integral Equations, and Fractional Calculus (J F Douglas) Applications to Problems in Polymer Physics and Rheology (H Schiessel et al.) Applications of Fractional Calculus Techniques to Problems in Biophysics (T F Nonnenmacher & R Metzler) Fractional Calculus and Regular Variation in Thermodynamics (R Hilfer) Readership: Statistical, theoretical and mathematical physicists. Keywords: Fractional Calculus in Physics Reviews: "This monograph provides a systematic treatment of the theory and applications of fractional calculus for physicists. It contains nine review articles surveying those areas in which fractional calculus has become important. All the chapters are self-contained." Mathematics Abstracts

This book reports on an outstanding research devoted to modeling and control of dynamic systems using fractional-order calculus. It describes the development of model-based control design methods for systems described by fractional dynamic models. More than 300 years had passed since Newton and Leibniz developed a set of mathematical tools we now know as calculus. Ever since then the idea of non-integer derivatives and integrals, universally referred to as fractional calculus, has been of interest to many researchers. However, due to various issues, the usage of fractional-order models in real-life

applications was limited. Advances in modern computer science made it possible to apply efficient numerical methods to the computation of fractional derivatives and integrals. This book describes novel methods developed by the author for fractional modeling and control, together with their successful application in real-world process control scenarios.

General Fractional Derivatives: Theory, Methods and Applications provides knowledge of the special functions with respect to another function, and the integro-differential operators where the integrals are of the convolution type and exist the singular, weakly singular and nonsingular kernels, which exhibit the fractional derivatives, fractional integrals, general fractional derivatives, and general fractional integrals of the constant and variable order without and with respect to another function due to the appearance of the power-law and complex herbivores to figure out the modern developments in theoretical and applied science. Features: Give some new results for fractional calculus of constant and variable orders. Discuss some new definitions for fractional calculus with respect to another function. Provide definitions for general fractional calculus of constant and variable orders. Report new results of general fractional calculus with respect to another function. Propose news special functions with respect to another function and their applications. Present new models for the anomalous relaxation and rheological behaviors. This book serves as a reference book and textbook for scientists and engineers in the fields of mathematics, physics, chemistry and engineering, senior undergraduate and graduate students. Dr. Xiao-Jun Yang is a full professor of Applied Mathematics and Mechanics, at China University of Mining and Technology, China. He is currently an editor of several scientific journals, such as Fractals, Applied Numerical Mathematics, Mathematical Modelling and Analysis, International Journal of Numerical Methods for Heat & Fluid Flow, and Thermal Science.

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