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Discrete Fractional Calculus Applications In

In the second part, selected applications of the discrete fractional calculus in the discrete system control theory are presented. In the discrete system identification, analysis and synthesis, one can consider integer or fractional models based on the fractional-order difference equations.

Discrete Fractional Calculus: Applications in Control and ...

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The volume is divided into three main parts. Part one contains a theoretical introduction to the classical and fractional-order discrete calculus where the fundamental role is played by the backward difference and sum. In the second part, selected applications of the discrete fractional calculus in the discrete system control theory are presented. In the discrete system identification, analysis and synthesis, one can consider integer or fractional models based on the fractional-order ...

Discrete Fractional Calculus: Applications In Control And ...

Discrete fractional calculus (DFC) has also an important position in the fractional calculus. The nabla operator in DFC is practical for the singular differential equations.

(PDF) Discrete Fractional Calculus ... - ResearchGate

In the second part, selected applications of the discrete fractional calculus in the

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discrete system control theory are presented. In the discrete system identification, analysis and synthesis, one can consider integer or fractional models based on the fractional-order difference equations.

Discrete Fractional Calculus - World Scientific

Discrete fractional calculus (DFC) is a straightforward tool for such applications. It holds a feature of non-locality and we now turn to the topic of non-locality combined with fuzzy set theory. But many properties in the classical difference calculus cannot hold and those results in fuzzy or interval analysis cannot be easily extended.

Discrete fractional calculus for ... - ScienceDirect.com

demonstrate some basic definitions and properties of discrete fractional calculus while developing the simplest discrete fractional variational theory. Some applications of the theory to tumor

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growth are also studied. The first
chapter is a brief introduction to discrete
fractional calculus that presents some

Discrete Fractional Calculus and Its Applications to Tumor ...

2. fractional calculus aids significantly in the fields of viscoelasticity, capacitor theory, electrical circuits, electro-analytical chemistry, neurology, diffusion, control theory. and statistics. The theory of fractional calculus for functions of the natural numbers, however, is far less developed.

The Theory of Discrete Fractional Calculus: Development ...

Fractional derivatives with memory effects have been widely used in image processing. This study investigates a discrete analogy of tempered fractional calculus on an isolated time scale and provides a new kind of discrete fractional calculus. Some useful properties and discrete Mittag-Leffler functions are derived.

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Discrete tempered fractional calculus for new chaotic ...

The author's purpose in this dissertation is to introduce, develop and apply the tools of discrete fractional calculus to the arena of fractional difference equations. To this end, we develop the Fractional Composition Rules and the Fractional Laplace Transform Method to solve a linear, fractional initial value problem in Chapters 2 and 3.

The Theory of Discrete Fractional Calculus: Development ...

Keywords: Discrete fractional calculus, finite fractional difference equation, Laplace transform on time scales. 1.

Introduction In this article we study discrete fractional calculus. We proceed to consider a family of finite fractional linear difference equations and we shall develop a transform method of solution.

ATransform Method in Discrete Fractional ... - Missouri S&T

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Furthermore, discrete fractional calculus has been a vital role in various fields of engineering and scientific applications, including fluid dynamics, plasma physics, nonlinear optics, and ...

Discrete Fractional Calculus | Request PDF

(2017) Discrete and continuous fractional persistence problems - the positivity property and applications. Communications in Nonlinear Science and Numerical Simulation 44 , 424-448.
(2017) Robust and adaptive techniques for numerical simulation of nonlinear partial differential equations of fractional order.

Discretized Fractional Calculus | SIAM Journal on ...

Using the gamma function to remove the discrete nature of the factorial function gives us a natural candidate for fractional applications of the integral operator.
$$\left(J^{\alpha} \right) (x) = \frac{1}{\Gamma(\alpha)}$$

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$(\alpha) \int_0^x (x-t)^{\alpha-1} f(t) dt$. This is in fact a well-defined operator.

Fractional calculus - Wikipedia

Generally speaking, fractional-order calculus can be used to better describe the systems with memory effect, and it is widely used in different fields including quantum mechanics, electromagnetic oscillations, control, and material mechanics. 14-19 14. H. Rudolf, Applications of Fractional Calculus in Physics (World Scientific, 2000). 15.

Modeling of discrete fracmemristor and its application ...

Fractional calculus applications in control systems, Proceedings of the IEEE 1990 National Aerospace and Electronics Conference, New York, USA, pp. 536-566. ... Observer for discrete fractional order systems, Proceedings of the 2nd IFAC Workshop on Fractional Differentiation Applications, Porto, Portugal, pp. 524-529.

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Controllability and Observability of Linear Discrete-Time ...

Fractional Calculus (FC) goes back to the beginning of the theory of differential calculus. Nevertheless, the application of FC just emerged in the last two decades, due to the progress in the area of chaos that revealed subtle relationships with the FC concepts. In the field of dynamical systems theory some work has been carried out but the proposed models and algorithms are still in a ...

Some Applications of Fractional Calculus in Engineering

Discrete fractional calculus has only recently been studied in detail and has many open questions to research. It has been shown that differential equation models involving fractional derivatives describe certain physical phenomena better than traditional whole-order differential equation models.

Modeling in Discrete Fractional

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Calculus - Undergraduate ...

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Discrete Fractional Calculus (2015) 2.
Discrete Delta Fractional Calculus and
Laplace Transforms 2.11. Exercises. 2.1.
Show that is of exponential order $r = 1$
iff f is bounded on \mathbb{R} . 2.2. Prove that if
is of exponential order $r > 0$, then is also of
exponential order r for \mathbb{R} . 2.3.

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