An Efficient Nonstandard Finite Difference Scheme for a Class of Fractional Chaotic Systems

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Abstract

In this paper, we formulate a new nonstandard finite difference (NSFD) scheme to study the dynamic treatments of a class of fractional chaotic systems. To design the new proposed scheme, an appropriate nonlocal framework is applied for the discretization of nonlinear terms. This method is easy to implement and preserves some important physical properties of the considered model, e.g., fixed points and their stability. Additionally, this scheme is explicit and inexpensive to solve fractional differential equations (FDEs). From a practical point of view, the stability analysis and chaotic behavior of three novel fractional systems are provided by the proposed approach. Numerical simulations and comparative results confirm that this scheme is also successful for the fractional chaotic systems with delay arguments.

Keywords

KeyWords Plus: ORDER SYSTEMS; EQUATIONS; OSCILLATOR; SYNCHRONIZATION; STABILITY; MODEL

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