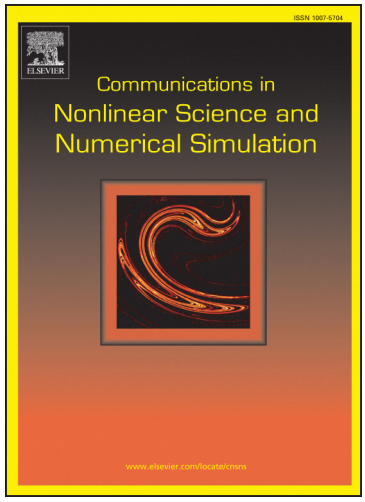

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Stability Analysis of Impulsive Functional Systems of Fractional Order

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Abstract

In this paper, a class of impulsive fractional functional differential systems is investigated. Sufficient conditions for stability of the zero solution are proved, extending the corresponding theory of impulsive functional differential equations. The investigations are carried out by using the comparison principle, coupled with the Lyapunov function method. We apply our results to an impulsive single species model of Lotka-Volterra type.

1 Introduction

Systems with short-term perturbations are often naturally described by impulsive differential equations [1–4]. Besides impulsive effects, delay effects exist widely in many real-world models [5, 6, 7]. In recent years, the theory of impulsive functional differential equations has been significantly developed; see [8–11] and the references therein.

On the other hand, fractional-order models are found to be more adequate than integer-order models in some real world problems. In fact, fractional differential equations appear naturally in a number of fields such as physics, polymer rheology, regular variation in thermodynamics, biophysics, blood flow phenomena, aerodynamics, electro-dynamics of complex medium, viscoelasticity, capacitor theory, electrical circuits, electron-analytical chemistry, biology, control theory, fitting of experimental data, etc. For examples and details, see [12–17] and the references therein.

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