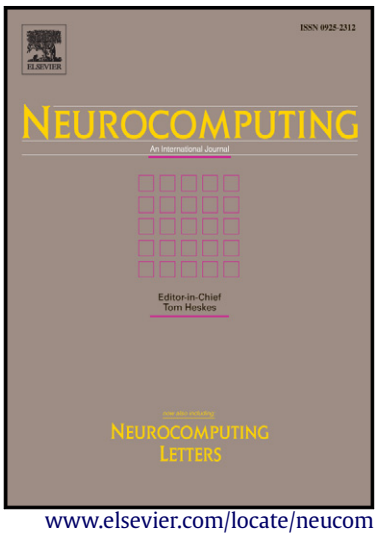

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Global stability problem for feedback control systems of impulsive fractional differential equations on networks

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Abstract: This paper studies a novel class of feedback control systems of impulsive fractional differential equations on networks (FCSIFDENs). By combining some graph theory and the Lyapunov method, we provide a systematic method for constructing a global Lyapunov function for FCSIFDENs. Consequently, a new global asymptotic stability principle and a new global Mittag-Leffler stability principle, which have a close relation to the topology property of the network, are given. Finally, numerical examples are given to demonstrate the effectiveness of the theoretical results.

Keywords: Global stability; Feedback control systems; Networks; Fractional differential equations; Lyapunov function.

1 Introduction

Complex networks widely exist in many different areas in real world including the Internet networks, biological neural networks, social connection networks, etc., and become an important part of our daily lives. In recent years, dynamical behaviors of the coupled systems of integer-order differential equations on networks (CSIDENs) have attracted current research interests and some results have been reported, see [1-11] and references therein. As we know, stability analysis, such as Lyapunov stability, is one of central tasks in the study of the coupled systems of differential equations on networks (CSDENs). Therefore, how to construct systematically a global Lyapunov function for CSDENs is an interesting question in the research. Recently, graph theory was proposed to construct a global Lyapunov function for coupled systems of integer-order differential equations on networks, and the global stability was explored in [2,3]. Furthermore, their results were

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