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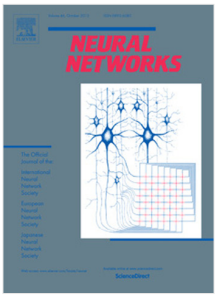

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Pinning impulsive synchronization for stochastic reaction-diffusion dynamical networks with delay *

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Abstract

This paper considers the problem of the asymptotic synchronization in mean square for stochastic reaction-diffusion complex dynamical networks with infinite delay driven by the Wiener processes in the infinite dimensional space under the pinning impulsive control. Two types of the impulsive controllers are proposed: the first is a single pinning impulsive controller on the first node, and the second is the pinning impulsive controller on a small portion of the network nodes. By using the variation-of-constant formula and the fixed point theorem, the asymptotic behavior of impulsive differential equations with infinite delay is first analyzed. Then, by introducing some operators in the abstract space, the networks are transformed into a set of stochastic coupled impulsive partial differential equations in Hilbert space. Under these two pinning impulsive control types, the asymptotic stability in mean square of stochastic coupled partial differential equations is examined by Lyapunov function approach and the comparison principle. The asymptotic synchronization in mean square of stochastic reaction-diffusion dynamical networks can be realized for these two pinning impulsive control schemes. One example is provided to present the potential application of the theoretic results obtained.

Keywords. asymptotic synchronization, pinning impulsive control, stochastic coupled neural networks, delay, reaction-diffusion.

1 Introduction

Complex dynamical networks (CDNs) have a large set of interconnected nodes of individual elements. These networks have attracted much attention since they can simulate some important practical models such as large-scale sensor networks, neural networks, social systems, genetic regulatory network, and many other fields. Emergent behavior has attracted increasing attention due to a growing interest in comprehending the intriguing swarm behaviors. Synchronization of CDNs has found significant applications

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