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Research Article

Mean-Square Exponential Synchronization of Markovian Switching Stochastic Complex Networks with Time-Varying Delays by Pinning Control

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This paper investigates the mean-square exponential synchronization of stochastic complex networks with Markovian switching and time-varying delays by using the pinning control method. The switching parameters are modeled by a continuous-time, finite-state Markov chain, and the complex network is subject to noise perturbations, Markovian switching, and internal and outer time-varying delays. Sufficient conditions for mean-square exponential synchronization are obtained by using the Lyapunov-Krasovskii functional, Itö's formula, and the linear matrix inequality (LMI), and numerical examples are given to demonstrate the validity of the theoretical results.

1. Introduction

A complex network is a structure that is made up of a large set of nodes (also called vertices) that are interconnected to varying extents by a set of links (also called edges). Coupled biological systems such as neural networks and socially interacting animal species are simple examples of complex networks and so too is the Internet and the World Wide Web [1]. Complex networks, indeed, are so ubiquitously found in nature and in the modern world that it is absolutely essential for us to have a thorough understanding of their dynamical