NEW RESULTS ON STABILITY OF STOCHASTIC NEURAL NETWORKS WITH MARKOVIAN SWITCHING AND MODE-DEPENDENT TIME-VARYING DELAYS*

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Abstract: This paper is concerned with the problem of exponential stability for a class of stochastic neural networks with Markovian switching and mode-dependent interval time-varying delays. A novel Lyapunov-Krasovskii functional is introduced with the idea of delay-partitioning, and a new exponential stability criterion is derived based on the new functional and free-weighting matrix method. This new criterion proves to be less conservative than the most existing results. Numerical examples are presented to illustrate the effectiveness of the proposed method.

Key words: *Lyapunov-Krasovskii functional, Markovian switching, mode-dependent time delays, neural networks, stochastic systems*

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1. Introduction

In the past years, neural networks (NNs) have been extensively studied due to the fact that they have found a large amount of successful applications in a variety of areas including pattern recognition, associative memory, and combinational optimization ([1], [2]). It is well known that these applications heavily depend on NNs' dynamic behaviors. Among the behaviors, stability is one of the most important ones that have received considerable research attention. In addition, time delays are frequently encountered in NNs, which are often the sources of instability and oscillations. Therefore, a great number of results on stability of delayed NNs have been reported in the literature (see, e.g., [3]-[7], and the references therein).

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