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IMPROVED ROBUST EXPONENTIAL STABILITY CRITERIA FOR UNCERTAIN STOCHASTIC NEURAL NETWORKS WITH TIME-VARYING DELAY

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Dedicated to Professor N.U. Ahmed on the occasion of his 75th birthday

Abstract. This paper is concerned with the robust exponential stability of uncertain stochastic neural networks with time-varying delays and parameter uncertainties. The parameter uncertainties are time-varying and norm-bounded, and the time-varying delay varies in a range. Based on Lyapunov-Krasovskii functional method, some new delay-dependent stability criteria are presented in terms of linear matrix inequalities, which guarantee the uncertain stochastic neural networks to be exponentially stable. Numerical examples are given to illustrate the effectiveness of our results.

Keywords. Stochastic neural networks, exponential stability, linear matrix inequality.

AMS (MOS) subject classification: 34C28, 34C28, 60H07, 60J65, 60F05.

1 Introduction

In recent years, various neural networks have attracted considerable attention due to their practical importance and successful applications in areas such as classification of patterns, associative memories, optimization, signal processing and knowledge acquisition. It has been shown that applications of neural networks rely heavily on the dynamical behaviors of the networks. Therefore, stability analysis for neural networks has been investigated, various approaches have been proposed and a large amount of results have been available in the literature. Time delay is commonly encountered in biological and artificial neural networks, and its existence is frequently a source of oscillation, instability and poor performance. Thus the stability of time-delay neural networks has long been a focused topic of theoretical as well as practical importance, see e.g. [2,3,9,13,15,16,22].