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IMPULSIVE STABILIZATION FOR DISCRETE-TIME UNCERTAIN BIDIRECTIONAL ASSOCIATIVE MEMORY NEURAL NETWORKS WITH TIME-VARYING DELAYS

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Abstract. In this paper, impulsive stabilization for discrete-time bidirectional associative memory (BAM) neural networks with time-varying delays and parameter uncertainties is investigated. The impulsive stabilization results are given by using Lyapunov functions. The obtained results show that impulses can robustly exponentially stabilize the discrete-time uncertain BAM neural networks with time-varying delays. Finally, two examples are presented to illustrate the effectiveness of the obtained results.

Keywords. impulsive stabilization, uncertainty, BAM neural network, time-varying delays, Lyapunov function.

1 Introduction

It is well known that bidirectional associative memory (BAM) neural networks were first proposed by Kosko in [8, 9]. A BAM neural network is composed of neurons arranged in two layers: the X- and Y -layers. The neurons in one layer are fully interconnected to the neurons in the other layer and have associated connection weights. In recent years, different kinds of BAM neural networks have been investigated because of their important applications in many fields such as pattern recognition, associative memory, combinatorial optimization, see [1, 2, 4, 5, 7–10, 13–19, 24, 25] and the references therein.

At the same time, time delay is unavoidable due to finite switching speeds of the amplifiers and influences severely the dynamical behavior of the networks in some cases. Besides delay effect, impulsive effect also likely exists in neural networks for switching phenomenon, frequency change or other sudden noise, see [2, 7, 10–12, 17, 19, 21–24] and the references therein. BAM neural networks with delays and impulses have attracted the attention of many researchers for their potential value in application, see, [7, 10, 17, 19, 24] and the references therein.