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GLOBAL POINT DISSIPATIVITY OF COHEN-GROSSBERG NEURAL NETWORKS WITH DELAYS

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Abstract. This paper addresses the global dissipativity of Cohen-Grossberg neural networks with both discrete time-varying delays and distributed time-varying delays. Based on the Lyapunov method and linear matrix inequalities (LMI), some sufficient conditions are obtained for checking the global point dissipativity. The criteria are expressed in terms of LMI, thus they can be efficiently verified. An illustrated example is given and comparison between our results and the previous ones admits that ours are less restrictive.

Keywords. Cohen-Grossberg neural networks, Lyapunov function, LMI, dissipativity.

AMS (MOS) subject classification: This is optional. But please supply them whenever possible.

1 Introduction

Dynamical neural networks have been intensively studied in recent years and have been applied in many fields such as optimization, control and image processing. Most of attention is paid to the dynamic behaviors of various neural networks, such as stability, attraction, and oscillation. And a large amount of results are available in the literatures [1-21]. In Refs.[1-4] the complete stability of neural networks with or without delays has been investigated. In Refs.[7-9] several sufficient conditions are presented for robust stability of delayed neural networks. In Refs. [13-20] the conditions for the existence of an equilibrium point, and the global stability of various neural networks with delays are investigated yielding results of significant generality which are expected to be useful in network design.

Although it has been recognized that discrete time-delays can be introduced into communication channels since they are ubiquitous in both the neural processing and signal transmission, a neural network also has a special nature due to the presence of an amount of parallel pathways with a variety of axon sizes and lengths. Such an inherent nature can be suitably modeled by distributed delays [22], because the signal propagation is distributed during a certain time period. For example, in [22], a neural circuit has been designed with distributed delays, which solves a general problem of