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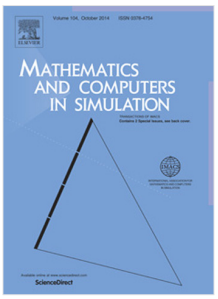

Impulsive effects on competitive neural networks with mixed delays: Existence and exponential stability analysis

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Impulsive effects on competitive neural networks with mixed delays: Existence and exponential stability analysis

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Abstract

In the proposed research work, the problem of dynamic analysis for a class of existence and global exponential stability of impulsive competitive neural networks(ICNNs) with multiple delays and effects of time scale parameter is investigated. Here the mixed delays includes infinite distributed delay and discrete time multiple delays. Firstly, by means of non-linear Lipschitz measure(NLM) and some matrix inequality techniques, the existence and uniqueness of the network equilibrium point is proved, while by fabricating a suitable Lyapunov functional, some new brand of algebraic sufficient conditions is ensured to be global exponential stability in voice of linear matrix inequality (LMI). Finally, a numerical example with simulations are shown to illustrate the essence and merits of our obtained analytical results with some existing ones in the available literature.

Keywords. *Competitive neural networks; Time scale; Global exponential stability; Multiple delays; Impulses.*

1 Introduction and Network model

In current scenario, the dynamics of neural network system have attracted significant attention owing to its strong applications with respect to different areas including computer science, information science, optimization, fault detection and reconstruction, intelligent robotics, fixed point computations and so forth. Appropriately, many sorts of networks have been briefly studied to define the dynamics of neural network system. For example, Cohen-Grossberg neural networks[10, 43], Hopfield neural networks [2, 36], cellular neural networks [5, 38], inertial neural networks [13, 35], recurrent neural networks [4, 8] and so on. Based on the extensive range of widespread applications, the stability of neural network dynamics leads to a great impact over the past few years, see for instance, [13, 21, 29, 31, 34, 43, 44]. It is noted that, the above mentioned neural network model contains one state variable. But as in the case of competitive neural network(CNN) model two kinds of state variables exists, one is the short term memory(LTM) and the other one is long term memory(STM). Cohen-Grossberg was firstly initiated the network called Cohen-Grossberg in 1983. As a result, Anke Meyer-Base elaborate two different time scales on CNNs, in which STM represents fast adapting neural performance and the other one describes the slow adoption of synapses by external stimuli. Since then, this type of neural networks has found in a broad spectrum of extensive applications such as in secure communications, image processing, optimization, control theory, etc. In [20], the authors analyzed the local uniform

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