EXPONENTIAL STABILITY OF PERIODIC SOLUTIONS FOR INERTIAL COHEN-GROSSBERG-TYPE NEURAL NETWORKS

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Abstract: In this paper, the exponential stability of periodic solutions for inertial Cohen-Grossberg-type neural networks are investigated. First, by properly chosen variable substitution the system is transformed to first order differential equation. Second, some sufficient conditions which can ensure the existence and exponential stability of periodic solutions for the system are obtained by using constructing suitable Lyapunov function and differential mean value theorem, applying the analysis method and inequality technique. Finally, two examples are given to illustrate the effectiveness of the results.

Key words: *Inertial Cohen-Grossberg-type neural networks, Lyapunov function, inequality technique, periodic solutions, exponential stability*

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1. Introduction

In recent decades, much attention has been devoted to the studies of artificial neural networks partially due to the fact that neural networks can be applied to signal processing, image processing, pattern recognition, control and optimization problems. The Cohen-Grossberg neural network [3], proposed in 1983, is focal research subject. There are many interesting phenomena in the dynamical behaviors of Cohen-Grossberg neural network. In the past years, the stability and periodic solutions problem for a class of Cohen-Grossberg neural networks

$$\frac{\mathrm{d}x_i(t)}{\mathrm{d}t} = -\alpha_i(x_i(t)) \left(h_i(x_i(t)) - \sum_{j=1}^{n} a_{ij} f_j(x_j(t)) - \sum_{j=1}^{n} b_{ij} f_j(x_j(t-\tau_{ij})) + I_i(t) \right), \tag{1}$$

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