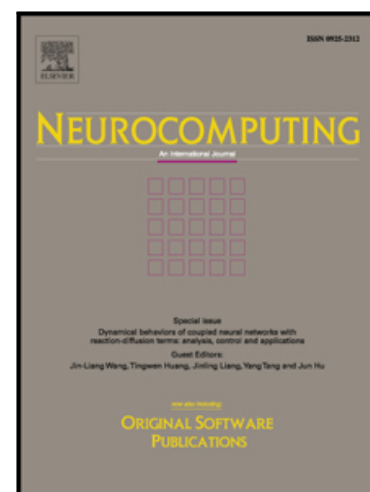


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Time-delay-induced instabilities and Hopf bifurcation analysis in 2-neuron network model with reaction-diffusion term

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Abstract

In this paper, we consider a general 2-neuron network model with reaction-diffusion term and time delay. We study the effect of time delay in kinetic terms of reaction-diffusive system. We mainly investigate the effects of time delay and diffusion term on the stability of the neural network model. Later, we present an algorithm to determine the existence of Hopf bifurcation for the delayed system with reaction-diffusion term along with Neumann boundary conditions. We determine the conditions on the delay parameter for the Hopf bifurcation to exist corresponding to the characteristic equation obtained by linearization of system. At the end, we give some numerical examples along with simulation results to show effectiveness of our analytic findings.

Keywords: Neural network; Time-delay; Reaction-Diffusion term; Instability, Hopf bifurcation.

AMS Subject classification: 92B20; 35K57; 70K50; 34K18.

1 Introduction

Due to vast applications of neural networks models, they possess a significant number of applications, such as combinatorial optimization, pattern recognition,

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