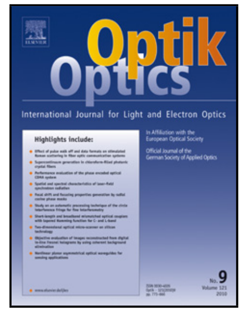
Accepted Manuscript



Title: Wirtinger-based multiple integral inequality approach to synchronization of stochastic neural networks

Author: Yue Zhang Cheng-De Zheng

PII: S0030-4026(16)31113-5
DOI: http://dx.doi.org/doi:10.1016/j.ijleo.2016.09.094
Reference: IJLEO 58237

To appear in:

Received date: 25-7-2016
Accepted date: 21-9-2016

Please cite this article as: Yue Zhang, Cheng-De Zheng, Wirtinger-based multiple integral inequality approach to synchronization of stochastic neural networks, *<![CDATA[Optik - International Journal for Light and Electron Optics]]>* (2016), http://dx.doi.org/10.1016/j.ijleo.2016.09.094

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

ACCEPTED MANUSCRIPT

Wirtinger-based multiple integral inequality approach to synchronization of stochastic neural networks

Yue Zhang, Cheng-De Zheng

School of Science, Dalian Jiaotong University, Dalian, 116028, P. R. China
E-mail: yuezhang78@sina.com(Y. Zhang),chd4211853@163.com(C.-D. Zheng)

Abstract: This paper investigates the synchronization problem for a class of chaotic neural networks with discrete and unbounded distributed time delays under stochastic perturbations. Firstly, based on the Wirtinger-based double integral inequality, two novel inequalities are proposed, which are multiple integral forms of the Wirtinger-based integral inequality. Next, by applying the Jensen-type integral inequality for stochastic case and combining the Jensen integral inequality with the reciprocally convex combination approach, a delay-dependent criterion is developed to achieve the synchronization for the stochastic chaotic neural networks in the sense of mean square. In the case of no stochastic perturbations, by applying the reciprocally convex combination approach for high order case and a free-matrix-based inequality, novel delay-dependent conditions are established to achieve the synchronization for the chaotic neural networks. All the results are based on dividing the bounding of activation function into two subintervals with equal length. Finally, two numerical examples are provided to demonstrate the effectiveness of the theoretical results.
Keywords: Stochastic neural networks; synchronization; Jensen integral inequality; Reciprocally convex combination; Wirtinger-based integral inequality

1 Introduction

Recently, neural networks have been found successful applications in various fields including image and signal processing, pattern recognition, fault diagnosis, associative memories, fixed-point computations, combinatorial optimization, and other scientific areas. Since these applications heavily depend on the dynamic behavior of the equilibrium point, the stability analysis of the equilibrium points of the designed network has been one of important issue. In the implementation of neural networks, time delays frequently occur due to the finite switching speed of amplifies and may cause instability or oscillation of neural networks. Therefore, considerable efforts have been done to asymptotic stability analysis of neural networks with time-delays. Especially, delay-dependent stability analysis has been investigated by many researchers [9, 19–21] since it is well known that delay-dependent stability criteria are generally less conservative than delay-independent ones when the sizes of time-delays are small.

In the last two decades, synchronization of chaos has been extensively studied. In the seminal paper [14], Pecora and Carroll first found that two chaotic trajectories with different initial conditions can be synchronized. Since then researchers around the world have been actively engaged to discover different possible synchronization scenario of chaos and many types of synchronization approaches have been presented due to its potential applications in secure communication, biological networks, chemical reactions, biological neural networks, information processing, etc. However, a real system is usually affected by external perturbations, which may change or destroy the synchronization. Actually, this noise perturbation may be treated as random because of its great uncertainty. Therefore, it is significant and important to consider the effect of stochastic

This work was supported by the National Natural Science Foundation of China (Grant No. 61273022).

Download English Version:

https://daneshyari.com/en/article/5026209

Download Persian Version:

https://daneshyari.com/article/5026209

Daneshyari.com