International Journal of Innovative
Computing, Information and Control
Volume **7**, Number **7(B)**, July **2011**

ICIC International ©2011 ISSN 1349-4198
pp. 4451–4463

ROBUST DELAY-DEPENDENT α-SYNCHRONIZATION OF A CLASS OF UNCERTAIN NOISE-PERTURBED TIME-DELAYED CHAOTIC AND HYPER-CHAOTIC SYSTEMS

Mahdi Sojoodi[1], Mokhtar Sha Sadeghi[2,*] and Mohammad Hossein Refan[3]

[1]Department of Mechatronics
School of Emerging Technologies Engineering
University of Tabriz
Tabriz, Iran
sojoodi@yahoo.com

[2]Department of Control Engineering
Electronics and Electric Engineering Faculty
Shiraz University of Technology
P. O. Box 71555-313, Shiraz, Fars, Iran
*Corresponding author: shasadeghi@sutech.ac.ir

[3]Electrical Engineering School
Shahid Rajaee University
Tehran, Iran
refan@srttu.edu

Received February 2010; revised August 2010

Abstract. *In this paper, a robust delay-dependent α-synchronization via output feedback for a class of uncertain noise-perturbed time-delayed chaotic systems with unequally perturbed parameters is considered. Based on the Lyapunov-Krasovskii stability theorem and linear matrix inequality (LMI) technique, a criterion is obtained to guarantee that the slave system is robustly α-synchronized to the master system, and the effects of noise perturbation on the synchronization error are attenuated to a prescribed level by using an H∞ performance index. Finally, numerical simulations on chaotic and hyper chaotic systems are presented to show the effectiveness of the proposed synchronization scheme.*
Keywords: Chaos α-synchronization, Parameter perturbation, Noise perturbation, Time-delay system, Linear matrix inequality

1. **Introduction.** During the recent decade, the stability analysis and control design of time-delayed chaotic systems have been of great interest to many scientists and engineers over the past years. In [1,2], guaranteed cost control for stabilizing time-delayed chaotic systems has been proposed. In [3], chaos synchronization of two coupled time-delayed systems using a unidirectional linear error feedback scheme has been developed. Controlling chaos of the Chen-Lee system with multiple time-delay has been studied in [4]. Based on the Lyapunov exponent and the Galerkin projection technique, the stability and chaos control of multiple time-delay Rössler system were analyzed in [5]. In recent years, the H_∞ control has been widely applied to stabilize a class of uncertain time-delayed systems dealing with external noise and disturbance. In [6], the H_∞ synchronization problem for a class of noise-perturbed chaotic system with multiple time-delays has been proposed. The authors in [7] proposed an active control scheme for synchronization of uncertain chaotic systems with parameter perturbations. However, the proposed method considered identical perturbations of parameters on both drive and response systems. More recently, a new method was presented for robust chaos synchronization of a class of chaotic systems with