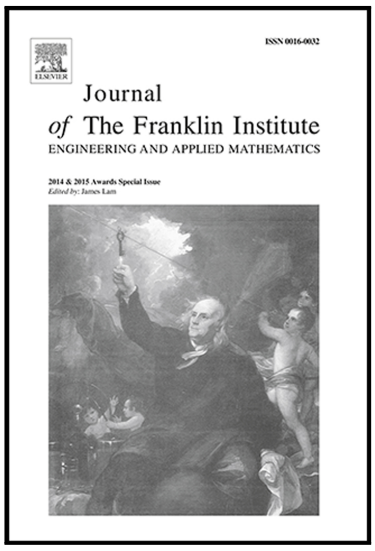

Finite-time multi-switching synchronization behavior for multiple chaotic systems with network transmission mode

Xiangyong Chen, Jinde Cao, Ju H. Park, Tingwen Huang, Jianlong Qiu

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Finite-time multi-switching synchronization behavior for multiple chaotic systems with network transmission mode

Xiangyong Chen[a,b], Jinde Cao [b,c*], Ju H. Park [d*], Tingwen Huang [e], Jianlong Qiu [a,f]

a. School of Automation and Electrical Engineering and Key Laboratory of Complex systems and Intelligent Computing in Universities of Shandong, Linyi University, Linyi 276005, China

b. School of Mathematics, Southeast University, Nanjing 210096, China

c. Department of Mathematics, Faculty of Science, King Abdulaziz University, Jeddah 21589, Saudi Arabia

d. Department of Electrical Engineering, Yeungnam University, Kyongsan 38541, Republic of Korea

e. Texas A&M University at Qatar, PO Box 23874, Doha, Qatar

f. Department of Information Technology, King Abdulaziz University, Jeddah 21589, Saudi Arabia

Abstract: By considering network transmission mode, this paper addresses the finite-time multi-switching synchronization problem for two kinds of multiple chaotic systems. For multiple same-order chaotic systems, we construct the general switching rules and analyze the existence of switching cases. The presented schemes guarantee the states of each derive system to be finite-timely synchronized with the desired states of every respond system in the different transmission paths and switching sequences. For multiple different order chaotic systems, we analyze a special multi-switching hybrid synchronization behavior, where part of the states are completely synchronized and the others belong to combination synchronization. Moveover, the easily verifiable criterion is derived for such synchronization. Finally, numerical examples are given to show the effectiveness of the presented theoretical results.

Keywords: Multiple chaotic systems; multi-switching synchronization; finite time; network transmission mode; switching rules

1. Introduction

It is well known that many fruitful results on synchronization of multiple chaotic systems (MCSs) have been continuously presented. And some complex synchronization mechanisms also were investigated. For example, Grassi studied projective synchronization among MCSs with series connection [1]. Various kinds of synchronization for MCSs with ring connection have been studied in [2, 3, 4]. Sun et al. [5] and Luo et al. [6] discussed respectively combination synchronization among three real or complex chaotic systems. These works have provided more important theoretical and application values than the pervious model for single drive and single response system. Therefore, it is meaningful to explore more complex synchronization modes for MCSs. In [7], Sun et al. presented the transmission synchronization of multi-systems for the first time, which had shown a class of complex synchronization mechanism, and may be helpful to improve the security of secret signals for multilateral communications. And subsequently, Chen et al. further extended this innovation to the multiple uncertain chaotic systems [8, 9, 10]. Until now, this topic are still open and challenging.

*Corresponding authors: Ju H. Park (jessie@ynu.ac.kr.) and Jinde Cao(jdcao@seu.edu.cn).