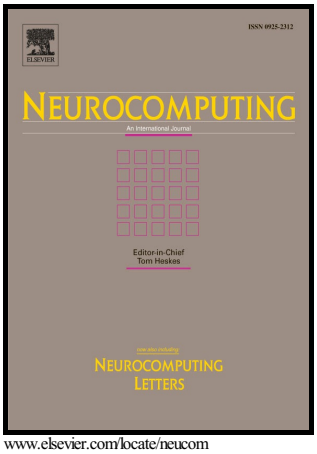

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Xin Wang, Kun She, Shouming Zhong, Huilan Yang

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New result on synchronization of complex dynamical networks with time-varying coupling delay and sampled-data control ☆

Xin Wang[a,*], Kun She[a], Shouming Zhong[b], Huilan Yang[b]

[a] *School of Information and Software Engineering, University of Electronic Science and Technology of China, Chengdu Sichuan 611731, PR China*

[b] *School of Mathematics Sciences, University of Electronic Science and Technology of China, Chengdu Sichuan 611731, PR China*

Abstract

In this paper, the sampled-data synchronization control problem is investigated for complex dynamical networks (CDNs) with time-varying coupling delay. By constructing a suitable Lyapunov-Krasovskii functional containing some novel triple integral terms with sufficient information about the actual sampling pattern, and together with a general inverse of first-order technique and some effective integral inequalities, less conservative conditions are given in terms of linear matrix inequalities (LMIs) to guarantee the synchronization of sampled-data CDNs with time-varying coupling delay. Numerical examples are provided to illustrate the effectiveness and less conservativeness of the proposed approaches.

Keywords: Synchronization, Triple integral terms, Complex dynamical networks, Sampled-data control, Time-varying coupling delay.

1. Introduction

Complex dynamical networks (CDNs) are comprised of a large set of nodes evolving according to their respective dynamical equations, some of these nodes are usually coupled according to the network topology. In recent years, much attention has been drawn to the study of CDNs, because CDNs are successfully applicable to describe a variety of real world systems including internet networks, biological networks, epidemic spreading networks, collaborative networks, social networks and so on [1-5]. Particularly, the synchronization of CDNs has been one of the focal points in many research and application fields such as chemical reactions, power grids, food webs and the world wide web [6-8]. In fact, synchronization is very popular in nature. For example, synchronization of coupled oscillators can well explain many natural phenomena such as spatiotemporal chaos, auto waves, and spiral waves [9]. Hence, some effectiveness synchronization control schemes have been proposed [10-24]. For example, in [10], an impulsive control scheme has been proposed to

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*Corresponding author

Email address: xinwang201314@126.com (Xin Wang)