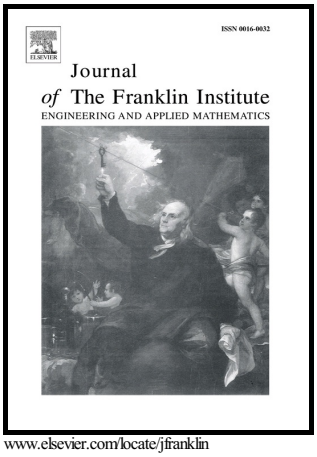

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Extended dissipative exponential synchronization of complex dynamical systems with coupling delay and sampled-data control ☆

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Abstract

In this paper, by proposing a sampled-data feedback control scheme, we investigate the sampled-data control problem for exponential synchronization of complex dynamical systems with coupling delay. Through constructing a novel Lyapunov functional, which takes a full consideration of the information of $t - t_k$ and $t_{k+1} - t$, $\forall t \in [t_k, t_{k+1})$, a new sufficient synchronization criterion is obtained based on the Lyapunov stability theory. Further, we consider the extended dissipativity analysis problem, which contains the H_∞ performance, passivity performance, dissipativity performance and $L_2 - L_\infty$ performance in a unified framework, and a sufficient condition in terms of strict LMIs is derived. Finally, simulation examples are employed to demonstrate the effectiveness and the reduced conservatism of the proposed method.

Keywords:

Extended dissipativity, Exponential synchronization, Complex networks, Sampled-data control

1. Introduction

In the real world exist variety kinds of complex dynamical networks(CDNs), such as the neural networks, the World Wide Web, the social networks, the food chain networks, and so forth [1-2]. And the study on CDNs has taken quite a long time. In the former literature, we devoted more attention to networks' topology structures, and proposed several kinds of network models which can reflect the real world better. But with the wide application of complex network in fields of computing, communications and engineering, etc, synchronization, as an interesting and significant phenomenon, has become an active field of research. In addition, time delay occurs commonly in CDNs because of the network traffic congestions as well as the finite speed of signal transmission over the links, which may decrease the quality of the system and even

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