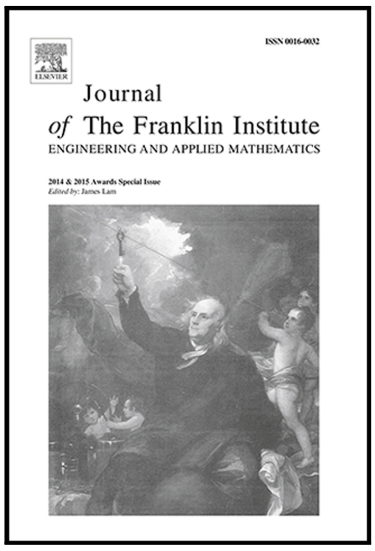

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Yang Yang, Dong Yue, Chuang Xu

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Dynamic Event-Triggered Leader-Following Consensus Control of A Class of Linear Multi-Agent Systems

Yang Yang[a,c,*], Dong Yue[a,b,c], Chuang Xu[a]

a. College of Automation & College of Artificial Intelligence, Nanjing University of Posts and Telecommunications, Nanjing, China.

b. Institute of Advanced Technology, Nanjing University of Posts and Telecommunications, Nanjing, China.

c. Jiangsu Engineering Laboratory of Big Data Analysis and Control for Active Distribution Network, Nanjing University of Posts and Telecommunications, Nanjing, China.

Abstract

We address the leader-following tracking consensus issue for a class of linear multi-agent systems (MASs) via dynamic event-triggered (DET) approaches in this paper. The DET communication mechanism is introduced by an additional internal dynamic variable, and is developed to schedule agents' data transmission. State observers are also employed to tackle the scenario wherein inner information of follower agents are not available for measurement. And then, state-based and observer-based distributed control proposals are proposed on the basis of dynamic event-triggered mechanism (DETM), respectively. To avoid continuous measurement information monitor, we present a technical approach for generation of the combinational information from their own neighboring agents only at event instants. The stabilities of the resulting closed-loop systems, both state-feedback one and output-feedback one, are rigorously analyzed in theory, and it is proven that all signals in the closed-loop system are bounded and Zeno behavior is also excluded. Simulation examples are presented to illustrate the theoretical claims.

Index Terms

Event-triggered control, multi-agent systems, observer, dynamic event-triggered mechanism, consensus control

I. Introduction

Cooperative behaviors of multi-agent systems (MASs) have garnered a tremendous amount of attention from the cybernetics community due to their feasible and potential applications in commercial, military and civil fields including surface vessel formation, robotics, wireless sensor networks [1]–[5]. Traditionally, the implementation of control task for such system is in a periodic manner, and it is called time-triggered control. Indeed, this control method has been extensively studied and provided fruitful results as well as numerous practical examples in recent years, see e.g. [6]–[9] and the references therein. Nevertheless, hardly necessary communication might lead to energy consumption, transformation bandwidth, and overload capacity of processors [10]–[16], where the system achieves its objective, and thus its application was restricted by hardware limitations from a from an industrial point of view. To address this issue, a particular focus of event-triggered control (ETC)

E-mail: yyang@njupt.edu.cn.