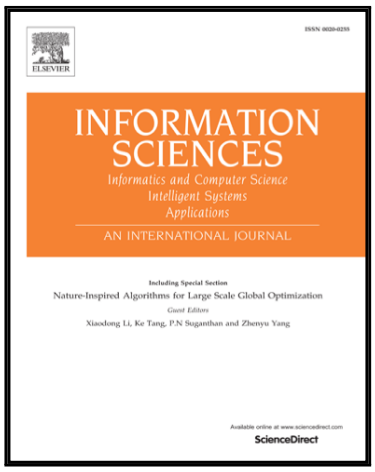

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Synchronization of Nonlinear Networked Agents under Event-Triggered Control ⋆

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Abstract

The global synchronization problem for second-order nonlinear multi-agent systems via event-triggered control is considered in this paper. Combining consensus theory with event-triggered idea, an event-triggered synchronization algorithm is proposed, which can achieve synchronization asymptotically for all agents. The unexpected Zeno phenomenon can be avoided for the proposed event-triggered mechanism since there is a lower bound on the time of two consecutive transmissions. An example is provided to verify the effectiveness of the proposed algorithm.

Keywords: Synchronization, Complex network, Nonlinear system, Event-triggered control.

1 Introduction

In many practical applications, e.g. , complex network [22,27,42], formation control [8,14,16], attitude alignment [7,10,11], cooperative control multiple missiles [24], flocking [31], rendezvous [6], the consensus theory plays a significant role. The aim of the consensus theory is to construct a control algorithm based on the local information such that all the states will reach a common value [12,30,32,47]. From the viewpoint of control, the difficulty and challenging for multi-agent system lies that not only single agent but also the cooperative control among multiple agents should be addressed.

In the literature, there have been many results about the consensus algorithms for different kinds of multiple dynamical systems, for example for single-integrator and second-order multi-agent dynamical systems in [18,20,23,28,35]. For the nonlinear cases, the consensus control protocols were given in [13,25,26,36,38,39], the distributed optimization consensus control laws was presented in [29]. Considering many controllers are realized through digital computers [3], some works about consensus for different nonlinear multi-agent systems through discrete-time control have been reported. In [4], the consensus problem via sampled-data control for double-integrator multi-agent systems was investigated. If there is time-varying communication topology, the work [17] presented the sampled-data control algorithm. If there are only the position information, the consensus control law via output feedback was designed in [43]. If there is communication delay between many agents, the work [44] considered the delayed consensus control algorithms. If the agent has second-order nonlinear dynamical structure, the corresponding sampled-data consensus algorithm was given in the work [9].

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