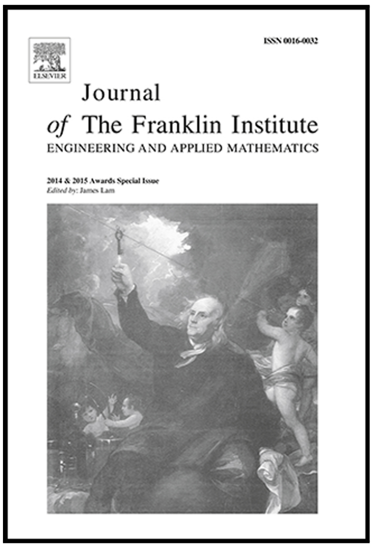

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Consensus Analysis for Multi-agent Systems via Periodic Event-triggered Algorithms with Quantized Information

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Abstract

In this article, a novel distributed event-triggered control protocol for the consensus of second-order multi-agent systems with undirected topology is studied. Based on the proposed control protocol, the event-triggered condition is evaluated only at every sampling instant. The control input for each agent will be updated with local information if and only if its condition is violated. Both ideal and quantized relative state measurements are considered under this framework. Some sufficient conditions for achieving consensus are derived using spectral properties of edge Laplacian matrix and the discrete-time Lyapunov function method. Finally, numerical examples are given to demonstrate the effectiveness of our theoretical results.

Keywords: Event-triggered control, Second-order multi-agent system, Consensus, Quantization

1. Introduction

Distributed cooperative control has attracted much attention in recent years due to its potential applications in many areas, such as spacecraft formation flying, sensor networks and cooperative surveillance [1, 2, 3, 4]. In the study of cooperative control of multi-agent systems, consensus/synchronization is the most fundamental problem and has been actively studied in recent years [5, 6, 7, 8, 9]. The main idea of achieving consensus is that agents share their information with neighbors to reach a certain global criterion of common interest.

In the literatures dealing with consensus problem, agents are commonly considered to be governed by first-order or second-order dynamics. Agents

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