

Accepted Manuscript

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PII: S0378-4371(17)30162-0

DOI: <http://dx.doi.org/10.1016/j.physa.2017.02.063>

Reference: PHYSA 18043

To appear in: *Physica A*

Received date: 5 November 2016

Revised date: 16 February 2017

Please cite this article as: S. Zhang, D. Xie, W. Yan, Decentralized event-triggered consensus control strategy for leader-follower networked systems, *Physica A* (2017), <http://dx.doi.org/10.1016/j.physa.2017.02.063>

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Decentralized Event-triggered Consensus Control Strategy for Leader-follower Networked Systems

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Abstract

In this paper, the consensus problem of leader-follower networked systems is addressed. At first, a centralized and a decentralized event-triggered control strategy are proposed, which make the control actuators of followers update at aperiodic event interval. In particular, the latter one makes each follower requires the local information only. After that, an improved triggering function that only uses the follower's own information and the neighbors' states at their latest event instants is developed to relax the requirement of the continuous state of the neighbors. In addition, the strategy does not require the information of the topology, nor the eigenvalues of the Laplacian matrix. And if the follower does not have direct connection to the leader, the leader's information is not required either. It is analytically shown that by using the proposed strategy the leader-follower networked system is able to reach consensus without continuous communication among followers. Simulation examples are given to show effectiveness of the proposed control strategy.

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Keywords: Event-triggered, leader-follower, networked systems, triggering function.

1. Introduction

The study of large scale networked systems have currently attracted considerable attention in the control community for its application in completing sophisticated task through cooperative behavior among the agents [1–3]. As one of important aspects in the networked system, several results have been made to the literature of coordinate control of the leader-follower networked system [4–10] and the references therein.

For practical implementation of the large scale networked system, the communication is effected by the bandwidth and speed of wireless channels. These characteristics determine

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