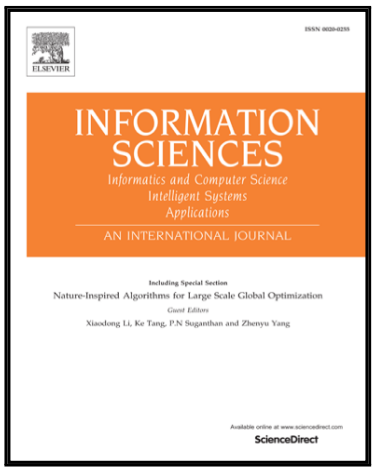

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On asynchronous event-triggered control of decentralized networked systems

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Abstract

This paper deals with the problem of asynchronous event-triggered control for decentralized networked systems. A group of geographically distributed sensors rather than a centralized sensor are deployed to asynchronously sample and measure the system's state signal. First, an asynchronous decentralized event-triggered transmission scheme is developed to check which sensor measurements should be transmitted to a remote control station via a network channel. Second, a series of artificial piecewise functions are introduced to incorporate the simultaneous effects of intermittent transmissions and network-induced delays into multiple delays. By considering distribution characteristics of these delays and using a switching Lyapunov-Krasovskii functional, criteria on $\mathcal{L}_2$ stability analysis and control design are derived. Finally, a well-used batch reactor system is employed to illustrate the effectiveness of the proposed control design method.

Keywords: Event-triggered transmission scheme, switching Lyapunov functional, decentralized control, networked systems.

1. Introduction

The last two decades have witnessed the flourishing evolution of networked control systems (NCSs), where communication networks are introduced for data transmission [14, 16, 18, 32, 38, 42]. Traditionally, NCSs implement a time-triggered mechanism to periodically perform signal transmission due to simplicity of system modeling, analysis and design by utilizing

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