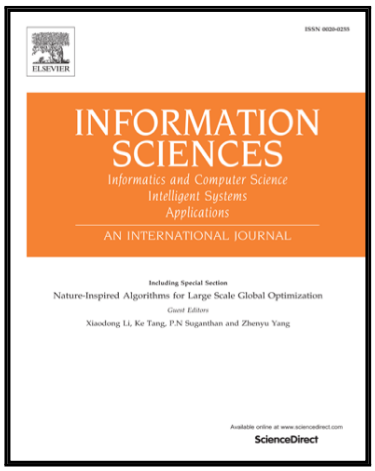

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End to end communication rate-based adaptive fault tolerant control of multi-agent systems under unreliable interconnections

Liang Zhao * and Guang-Hong Yang †

Abstract

The active fault tolerant control (FTC) problem for nonidentical high-order multi-agent systems (MASs) with network disconnections and actuator faults is studied in this paper. To address the challenges incurred by network disconnections, a novel FTC method based on the end-to-end communication rates is proposed, where the MAS is considered as a cyber-physical system (CPS). In the cyber components, the pre-specified minimum values of the end-to-end communication rates are used to determine the status of network connection, then a logic-based switching control approach is designed to deal with the network disconnections. In the physical components, a cooperative controller and a high-gain observer-like protocol are presented to compensate the actuator faults and the nonidentical nonlinearities. Compared with the previous turning mechanisms based on the output errors method, the end-to-end communication rates method is a more direct way to determine status of network connection. Finally, a simulation is given to validate the effectiveness of the proposed method.

Key words: Fault tolerant control; Cyber-physical system; Multi-agent system; Consensus; Nonlinear systems; Cooperative control

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