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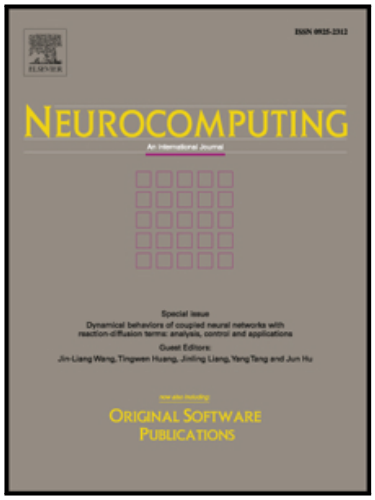

Self-Triggered Fault Estimation and Fault Tolerant Control for Networked Control Systems

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Self-Triggered Fault Estimation and Fault Tolerant Control for Networked Control Systems☆

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Abstract

A framework of self-triggered fault diagnosis (FD) and fault tolerant control (FTC) for networked control systems (NCSs) is presented in this paper. The self-triggered scheduler is implemented in a smart sensor node. By means of uncertain polytopic theory, we first design a fault diagnosis observer, which has a similar structure with Kalman filter, to simultaneously estimate the fault and state using the self-triggered nonuniform sampled outputs. Then, based on the obtained fault and state information, an active fault tolerant controller with a state-estimate-dependent self-triggered scheduler is provided. We prove that the closed-loop faulty system is input-to-state stable (ISS) under the proposed self-triggered sampling mechanism. Finally, simulation results are provided to verify that the proposed self-triggered FD and FTC scheme can significantly reduce the sampling cost while preserving the desired fault estimation and FTC performance.

Keywords: self-triggered sampling, fault estimation, fault accommodation, quasi-Kalman observer

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