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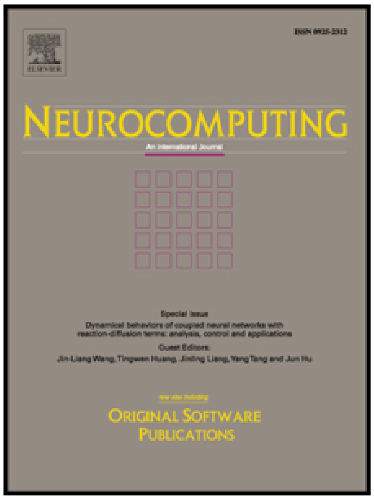

Event-triggered fault detection for discrete-time Lipschitz nonlinear networked systems in finite-frequency domain

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Event-triggered fault detection for discrete-time Lipschitz nonlinear networked systems in finite-frequency domain

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Abstract

The problem of event-triggered fault detection (FD) filter design for discrete-time Lipschitz nonlinear networked systems with finite-frequency specifications is investigated. The event-triggered transmission scheme is introduced to mitigate the utility of limited network bandwidth. The developed filter combines the H_∞ and H_- indices. For this class of systems, the generalized Kalman-Yakubovic-Popov lemma-based finite-frequency FD filter design methods are invalid. To solve this problem, the nonlinear error dynamics are transformed into a linear parameter varying (LPV) system based on the use of a reformulated Lipschitz property and a new lemma is developed to capture the system performances in finite-frequency domain. By introducing slack variable techniques, sufficient conditions for the design of FD filter are derived in terms of linear matrix inequalities (LMIs). The proposed design method can significantly reduce the data transmission and achieve a better FD performance than that in full frequency domain. Finally, two examples are presented to validate the effectiveness and superiority of the new results.

Keywords: Networked control systems, Lipschitz nonlinear systems, Fault detection, Event-triggered scheme, Finite frequency, H_-/H_∞.

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