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Event-triggered communication and H_∞ control co-design for networked control systems. (English) Zbl 1319.93022

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Summary: This paper studies an event-triggered communication scheme and an H_∞ control co-design method for networked control systems (NCSs) with communication delay and packet loss. First, an event-triggered communication scheme and a sampled-state-error dependent model for NCSs are presented. In this scheme and model, (a) the sensor takes samples in a periodic manner; (b) a triggering condition is applied to the sampled signal to determine whether a signal is transmitted to the controller or not; and (c) the closed-loop system with a networked state feedback controller is modeled as a time-delay system. Secondly, by constructing a novel Lyapunov-Krasovskii functional, three theorems for the system asymptotical stability subject to imperfect communications are derived. Thirdly, a new algorithm is developed for the triggering condition and the controller feedback gain to meet the specified performance. This design algorithm is based on the two permissible limits on the signal transfer. These limits are: the maximum allowable communication delay bound and the maximum allowable number of successive packet losses, respectively. Finally, the proposed co-design method is demonstrated by two numerical examples.

MSC:

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Keywords:

networked control systems; event-triggered communication scheme; co-design; packet loss

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