短文

带有传输受限和随机丢包的网络化控制系统的故障检测方法研究

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摘要

研究了同时存在传输受限和随机丢包情况下的网络化控制系统的故障检测问题, 给出了残差发生、残差评价和误报率分析的方法. 首先, 基于确定性的系统描述, 本文给出了基于周期系统理论的残差发生方法. 接下来, 在充分利用随机丢包概率特性的基础上, 本文给出了残差评价方法. 最后, 利用切比雪夫不等式, 本文给出了故障检测误报率的计算方法. 仿真结果证实了算法的有效性.

关键词　　故障检测　残差发生　残差评价　网络化控制系统　丢包

分类号

Fault Detection of Networked Control Systems Subject to Access Constraints and Random Packet Dropout

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Abstract
In this paper, the problem of fault detection is addressed for networked control systems (NCSs) subject to both access constraints and random packet dropout, which to the best of our knowledge has not been considered before. Both residual generation and residual evaluation as well as false alarm computation of the designated threshold are given. First, based on a deterministic formulation, residual generation is carried out in the periodic system framework. Then, residual evaluation is achieved by making full use of the stochastic properties of the random packet dropout. Finally, performance evaluation of the designated threshold, i.e., the computation of false alarm rate, is fulfilled with the assistance of Chebyshev's inequality. Simulation results are given to illustrate effectiveness of the proposed method.

Key words　Fault detection (FD)　residual generation　residual evaluation　networked control system (NCS)　packet dropout

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