Fault detection filter design for stochastic networked control systems.

Summary: This paper is concerned with the fault detection filter (FDF) design for networked control systems subject to time-varying transmission intervals and delays, packet dropouts, and communication constraints. The considered communication constraint is that only one network node is allowed to gain access to the shared communication channel. Also, the accessing of each node is scheduled by a specified stochastic protocol, and the remote FDFs perform the FD task only with these partially available measurements. By focus on the network-induced phenomena, the whole FD system are first modeled in the framework of switched stochastic systems with multiple stochastic parameters. Subsequently, by using the multi-Lyapunov functional approach and novel analysis approach, less conservative conditions including some previous existing results are derived to construct such FDFs. Finally, an example is given to illustrate the effectiveness of the proposed method.

Keywords: fault detection; networked control system; communication constraints; switched stochastic system; multiple stochastic parameters

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