Fault detection for uncertain nonlinear systems via recursive observer and tight threshold.

Summary: This paper presents an fault detection (FD) method for a class of uncertain nonlinear systems with unmatched nonlinear fault functions and disturbances. A recursive FD observer is designed with predetermined and small output estimation error. The nonlinear observer gain function is achieved by introducing predetermined output estimation accuracy-dependent nonnegative functions. Combining Lyapunov functions, it is shown that the absolute value of the residual signal is equal or lesser than tight threshold before fault occurrence. The FD scheme is proposed following fault detectability analysis, simulation example indicates the validity of the proposed method.

MSC:
93Exx Controllability, observability, and system structure
93Cxx Model systems in control theory
93Exx Stochastic systems and control

Keywords:
fault detection; nonlinear systems; recursive observer; tight threshold

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References:
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