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2.4.2 Problem formulation; 2.4.3 Residual generation; 2.4.4 Residual evaluation; 2.5 Quadruple Tank System; 2.5.1 Model of the QTS; 2.5.2 Fault scenarios in QTS; 2.5.3 Implementation structure of UKF; 2.5.4 UKF with centralized multi-sensor data fusion; 2.5.5 UKF with decentralized multi-sensor data fusion; 2.5.6 Drift detection; 2.6 Industrial Utility Boiler; 2.6.1 Steam flow dynamics; 2.6.2 Drum pressure dynamics; 2.6.3 Drum level dynamics; 2.6.4 Steam temperature; 2.6.5 Fault model for the utility boiler; 2.6.6 Fault scenarios in the utility boiler
2.6.7 UKF with centralized multi-sensor data fusion; 2.6.8 UKF with decentralized multi-sensor data fusion; 2.6.9 Drift detection; 2.6.10 Remarks; 2.7 Notes; References; 3 Robust Fault Detection; 3.1 Distributed Fault Diagnosis; 3.1.1 Introduction; 3.1.2 System model; 3.1.3 Distributed FDI architecture; 3.1.4 Distributed fault detection method; 3.1.5 Adaptive thresholds; 3.1.6 Distributed fault isolation method; 3.1.7 Adaptive thresholds for DFDI; 3.1.8 Fault detectability condition; 3.1.9 Fault isolability analysis; 3.1.10 Stability and learning capability; 3.2 Robust Fault Detection Filters
3.2.1 Reference model; 3.2.2 Design of adaptive threshold; 3.2.3 Iterative update of noise mean and covariance; 3.2.4 Unscented transformation (UT); 3.2.5 Car-like mobile robot application; 3.3 Simultaneous Fault Detection and Control; 3.3.1 Introduction; 3.3.2 System model; 3.3.3 Problem formulation; 3.3.4 Simultaneous fault detection and control problem; 3.3.5 Two-tank system simulation; 3.4 Data-Driven Fault Detection Design; 3.4.1 Introduction; 3.4.2 Problem formulation; 3.4.3 Selection of weighting matrix; 3.4.4 Design of FDF for time-delay system; 3.4.5 LMI design approach
3.4.6 Four-tank system simulation

Sommario/riassunto

In recent years, control systems have become more sophisticated in order to meet increased performance and safety requirements for modern technological systems. Engineers are becoming more aware that conventional feedback control design for a complex system may result in unsatisfactory performance, or even instability, in the event of malfunctions in actuators, sensors or other system components. In order to circumvent such weaknesses, new approaches to control system design have emerged which can tolerate component malfunctions while maintaining acceptable stability and performance. These
