Abstract

In this article, a fault detection and diagnosis method is developed for nonlinear systems described by multimodels approach. The main contribution consists in the detection, isolation and estimation of faults for the nonlinear systems using a fault-decoupled adaptive filter. Based on the assumption that the dynamic behavior of the process is described by a multimodel approach around different operating points, a set of residuals is established in order to generate weighting functions robust to faults. These robust weighting functions are directly linked to the adaptive filter effectiveness which provides multiple fault magnitude estimations for the whole operating range of the system. Stability conditions of the adaptive filter are studied and its performance is tested using a threetank hydraulic system.

Keywords

Fault detection and isolation, Multimodels, Decoupling filter, LMF, Stabil.