

Detection and Accommodation of Second Order Distributed Parameter Systems with Abrupt Changes in Input Term: Stability and Adaptation.

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Abstract: In this note, we employ nonlinear on-line parameter estimation methods based on adaptive neural network approximators for detecting changes due to actuator faults in a class of second order distributed parameter systems. The motivating example is a cantilevered beam actuated via a pair of piezoceramic patches. We examine changes in the control input term, which provide a simple and practical model of actuator failures. Using Lyapunov redesign methods, a stable learning scheme for fault diagnosis is proposed. The resulting fault diagnosis scheme is utilized for control reconfiguration in order to accommodate the system's actuator failure. A numerical algorithm is provided for the implementation of the detection and accommodation scheme and simulation studies are used to illustrate the applicability of the theoretical results.

Keywords:

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