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An Adaptive Change Detection Scheme for a Nonlinear Beam Model.

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Abstract:

In this paper, we consider parameter estimation techniques for detecting changes of a nonlinear nature in an Euler–Bernoulli beam model. The nonlinear stiffness used provides a very simple model of damage, and the adaptive estimation algorithm is used to track the onset of the nonlinearity. Using Lyapunov redesign methods, extended and applied to infinite dimensional systems, a stable learning scheme is developed. The resulting parameter adaptation rule is able to "sense" the instance of the fault occurrence. In addition, it identifies the location and the shape of the fault where the beam is persistently excited. Simulation studies are used to illustrate the applicability of the theoretical results.

Keywords:

AMS Subject Classification: