REDUCTION OF FALSE ALARMS IN FAULT DETECTION PROBLEMS

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ABSTRACT. *In this paper, we propose a new technique for enhancing the residual signal in a way that results in a reduced rate of false alarms. This is achieved by eliminating most of the noise from the residual signal through an autoregressive (AR) modeling. The AR model parameters are estimated in real time. Computer experiments using experimental data from NASA Langley Research Center are used to demonstrate an implementation of the proposed technique.*
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1. **Introduction.** Fault detection and identification (FDI) is an important and active research field. Published literature in the field contains many techniques for detecting faults: observers, parity space methods, eigenstructure assignment, parameter identification based approaches, etc. Useful results can be found in several survey papers [1-3]. In many practical cases faults are difficult to detect early, especially when measured (sensor) data are corrupted by noise. The presence of noise results in false alarms, which is a well known problem in the FDI community.

The basis of most fault detection techniques (when considered in a stochastic context) is that in the nominal, healthy (fault-free) case, the residuals constitute a random process with known statistical properties; when a fault occurs, the residuals constitute a different statistical process. The whole idea of fault detection is, then, exactly the same as detection of a change in statistical properties. During recent years, a lot of research has been done on FDI for stochastic systems (e.g., [4-7]) – the common technique in all of these methods is the generation of a residual signal that can be used, with a high level of confidence, as an indicator of faults. Also, all FDI includes, in one form or another, tests of hypotheses