State Estimation of Degradation Process Subject to Random Change of Mode

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ABSTRACT

Due to changes of the surrounding environment, the dynamic of one degradation process may change at random time and it follows different modes before and after change occurs. For solving on-line degradation state estimation problems subject to random change of mode, a novel state estimation method is proposed in this paper based on the degradation models and related monitored data. The proposed method employs (1) sequential probability ratio test based on log-likelihood ratio to detect the unknown change time of degradation mode, and (2) particle filtering to estimate the degradation states given observations and also to evaluate the decision functions of the sequential probability ratio test. A case study is presented to illustrate the effectiveness of the proposed method.