

OPTIMAL REPLACEMENT OF A COMPONENT IN A PARTIALLY-OBSERVABLE ENVIRONMENT

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Motivated by wind energy systems, we present a switching diffusion model to characterize the degradation of a component operating in a random environment. A Markov chain Monte Carlo scheme is used to infer the parameters of the environment model using real degradation observations and to update the components lifetime distribution. We establish the optimality of threshold replacement policies when the environment is uncertain but degradation is observable using a partially-observable Markov decision process framework. Numerical examples will be presented to illustrate the estimation procedures and optimal replacement policies.