Bayesian Reliability Analysis of Accelerated Gamma Degradation Processes under Time-Scale Transformation with Random Effects

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Abstract

Accelerated degradation tests have been widely used to assess the lifetime information of highly reliable products. In this work, we apply Bayesian approach to the accelerated degradation test based on gamma processes with random effects under power transformation of the time-scale. A mixture prior is considered to identify the parameter of time-scale transformation. Reliability inference of the failure time distribution under normal use condition will be described through the posterior sample of the underlying parameters obtained by the Markov chain Monte Carlo procedure. Simulation study is presented to evaluate the performance of the proposed method and the model fitting issue. The proposed method is applied to an LED light intensity data set as well.

Keywords: Constant-stress accelerated degradation test, gamma process, random effects, mixture prior, MCMC, DIC.