Estimating Reliability Using Bayesian Analysis of Degradation Data

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Abstract: Considering the broader need for rapid estimation of lifetimes of high duration products and knowing that the main factors of degradation of LEDs are high operating currents and temperature stress, a set of LEDs was exposed to three levels of temperature and their luminosity was measured weekly. The data analysis was conducted using ordinary least squares and Bayesian inference using OpenBUGS software. The failure threshold used was reported life (70%) or the time of the maintenance operation to find 70% of lumens. Subsequently, with an analysis of the accelerated data, we ascertain the time to failure at the operating temperature of 25 ℃. The ultimate goal of this work was to have an accessible methodology for analyzing degradation data with Bayesian inference, so that through simulation, we can incorporate probabilistic information sampling and the calculation of LEDs' mean time to failure.

Keywords: Bayesian Inference, Degradation, LEDs, Reliability