Planning of an Accelerated Degradation Test

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Abstract

Accelerated degradation tests (ADTs) are widely used to access the lifetime information of highly reliable products. To obtain the more accurate prediction of lifetime information, how to design an efficient experiment under the limited budget is a critical issue for reliability analysts. Many literature addressed this problem and indicated that a two-level design is the optimum strategy for an ADT plan. Considering easier operating conditions for experimenters, most literature developed the optimum designs under the assumptions that the numbers of measurements and the duration between two inspections within a degradation path are equal for all testing stress levels. However, some real applications were conducted under the operating conditions that the numbers of measurements and sampling frequencies are different for all stress levels. In this study, based on the exponential dispersion (ED) degradation model, we determine the optimum planning under different constraints of operating conditions so that the asymptotic variance of a prediction can be minimized.