

Optimal Measurement Time Planning for Gamma Degradation Tests

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Abstract

As a product approaches launch, assessing product lifetime becomes a critical issue for manufacturers. Degradation tests, which are widely used in industry, are one method for this evaluation. Among various degradation models, gamma processes are suitable for modeling degradation data with monotonic properties. To efficiently design a gamma degradation test, several studies have explored optimal design under cost constraints, including considerations for the number of test units, measurement times, number of measurements, and testing termination time. However, because of practical convenience, most of the existing literature focuses on designs with equal measurement intervals and provides limited discussion on measurement interval planning. In this paper, we prove that the equal measurement interval plan is the least efficient and propose an optimal measurement interval plan. Furthermore, we propose optimal designs for two types of measurement interval plans.