Department of Mathematical Sciences

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Colloquium Series

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Statistical Analysis of Step Stress Accelerated Life Testings

Step-stress accelerated life testing (SSALT) is a commonly used test for highly reliabilty products to shorten the testing period by subjecting the products to more severe conditions, resulting in rapid failure data collection. In this talk, we present statistical methods for analysis of SSALT experiments by using the cumulative exposure (CE) and proportional hazard (PH) models. With considering two common censoring schemes in the experiment, we compare the practical efficiency of step-down and step-up stress accelerated life tests based on different criteria. Through theoretical and simulation studies, we demonstrate that under a type-I censoring scheme, the step-down test plan results in a shorter mean failure time of testing units than that of the step-up stress accelerated life test. With type-II censoring, the step-down test is also preferred for products with long lifetimes, while the step-up procedure works better applied to units with early and occasional failures.

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