Planning Sequential Accelerated Life Testing

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Abstract

Many products are designed to last longer than the typical lifespan of human being. It is thus a challenge to validate the designed life through reliability tests even when testing is conducted under much harsher environment. Not only that test duration is usually constrained, but the samples available for testing may also be costly and/or limited in quantity. Statistically optimal plans will allow for efficient use of testing resources and yet derive the most information from the test. In this presentation, we shall discuss ideas related to designing test plans for both constant stress and step stress ALT; leading to the statistical optimal plan for sequential ALT. While that for constant-stress ALT is basically a Bayesian approach and requires numerical solutions, that for the step-stress ALT entails a dynamic programming formulation. For the latter, the formulation and optimal solutions are only available for exponential lifetime and there are rooms for further research.