Adaptive Designs
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ADAPTIVE BAYESIAN DESIGNS FOR ACCELERATED LIFE TESTING

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Abstract

In this paper, we present a Bayesian decision theoretic framework for the design of accelerated life tests. In our development, we assume that quality of inference at the "use stress" is the only concern to the designer and use a quadratic loss function as the design criterion. We derive optimal designs for exponential life models under a given form of an "acceleration function" using a complete test. Linear Bayes methods play an important role in our making inference. Sequential processing of information and the ability to obtain one-point designs make the approach attractive for developing adaptive design strategies.

1. Introduction. In accelerated life testing (ALT), items are subjected to an environment that is more severe than the *use environment* (i.e., the normal operating environment) in order to induce early failures. The accelerated environment is achieved by increasing the levels of one or more of the stress variables that constitute the environment. For instance, typical stresses associated with mechanical and electronic devices include temperature, wind, pressure, amplitude, and voltage. Test data collected in the accelerated environment are then used for

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