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Estimation of constant-stress accelerated life test for Weibull distribution with nonconstant shape parameter

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Abstract

Statistical inference is considered on constant-stress accelerated life test when the failure data are progressively Type-II censored. Under the assumption that the Weibull shape parameter is nonconstant and both Weibull parameters follow log-linear life-stress model with stress, the unknown coefficient parameters are estimated by using methods of maximum likelihood and expectation-maximization based estimations as well as approximation maximum likelihood estimation. The confidence intervals of unknown parameters are also constructed based on asymptotic theory and bootstrap technique. Simulation study and a real data example are presented for illustrative purpose.

Keywords: Accelerated life test, Weibull population, Progressive Censoring, Nonconstant shape parameters, Maximum likelihood estimation, Bootstrap technique

1. Introduction

With the development of techniques in manufacturing design, modern products feature the characteristic of highly reliable and substantially long span, which makes it infeasible to test units under normal use condition, where the test cycle may be too long and the test cost tends to be far too expensive. Under this situation, accelerated life testing (ALT) have been

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