Estimation of the Burr XII distribution for Partially Accelerated Life Tests using Censored Data

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Abstract

This thesis deals with the problem of estimation concerning the parameters of the Burr type XII distribution. The unknown parameters are estimated under both step and constant stress PALT for types I and II censored samples. The first part of the thesis is devoted to the step-stress PALT. Maximum likelihood estimators and their asymptotic variances are developed for the parameters of the distribution as well as for the acceleration factor. Also the Bayesian approach is used to estimate the unknown parameters of our life time distribution and the acceleration factor in the case of type-I and type-II censored samples. The Bayes estimates and their posterior variances are obtained in the case of non-informative prior while the case of informative priors is discussed theoretically.

Part two of the thesis focus on the second scheme of PALT which is the constant-stress PALT. The maximum likelihood estimators and the asymptotic variances of the parameters of our model and the acceleration factor are obtained under type-I and type-II censoring. Estimation using the Bayesian approach using type-I and type-II censored data is considered. The posterior variances of the Bayes estimates are obtained to evaluate their performance in the case of non-informative
prior. The case of informative priors is discussed theoretically.

At the end of each chapter, a simulation study is presented to investigate the efficiency of the estimates and to illustrate the theoretical results under the different sampling schemes for various sample sizes.

**Key words:** Step stress; Constant stress; Partially accelerated life tests; Type I censoring; Type II censoring; Burr type XII distribution; Maximum likelihood estimation; Bayesian approach; Non Informative prior; Informative priors; Newton-Raphson Algorithm.