제품의 크기를 고려한 최적 가속 수명 시험의 설계
(An Optimal Design of Accelerated Life Testing
for Products with unequal Size)

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Abstract

This thesis is concerned with the problem of optimally designing accelerated life test plans for products with unequal size. Two levels, high and low, of stress are used. It is assumed that the life distribution of test products is Weibull with a scale parameter that is a log-linear function of stress. For the effect of size, we assumed that the failure rate of the product is proportional to the product size. Minimization of the asymptotic variance of maximum likelihood estimator of $100p$-th percentile at the design stress is used as an optimally criterion. Two cases are considered:

(i) The sample allocation policy is obtained for both complete and type I censored case when the stress levels and sample proportion allocated to each are given.

(ii) The low stress level, sample proportion allocated to stress levels and the sample allocation policy are obtained for type I censored case when only high stress level is given.

Hookes-Jeeves pattern search method combined with penalty function method is used to obtain optimal test plans. Optimal plans with unequal size are compared with those for test products with equal size. The sensitivity analysis for model parameters is performed.