

## A sequential order statistics approach to step-stress testing

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**Abstract** For general step-stress experiments with arbitrary baseline distributions, wherein the stress levels change immediately after having observed pre-specified numbers of observations under each stress level, a sequential order statistics model is proposed and associated inferential issues are discussed. Maximum likelihood estimators (MLEs) of the mean lifetimes at different stress levels are derived, and some useful properties of the MLEs are established. Joint MLEs are also derived when an additional location parameter is introduced into the model, and estimation under order restriction of the parameters at different stress levels is finally discussed.

**Keywords** Accelerated life-testing · Step-stress experiment · Generalized order statistics ·  $k$ -out-of- $n$  system · Location-scale family of distributions · Maximum likelihood estimation · Order restricted inference