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Optimal Design of Step-Stress Partially Life Test Using Multiply Censored Exponential Data with Random Removals

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Abstract : The major assumption in accelerated life tests (ALT) is that the mathematical model relating the lifetime of a test unit and the stress are known or can be assumed. In some cases, such life–stress relationships are not known and cannot be assumed, i.e. ALT data cannot be extrapolated to use condition. So, in such cases, partially accelerated life test (PALT) is a more suitable test to be performed for which tested units are subjected to both normal and accelerated conditions. This study deals with estimating information about failure times of items under step-stress partially accelerated life tests using progressive failure-censored hybrid data with random removals. The life data of the units under test is considered to follow exponential life distribution. The removals from the test are assumed to have binomial distributions. The point and interval maximum likelihood estimations are obtained for unknown distribution parameters and tampering coefficient. An optimum test plan is developed using the D-optimality criterion. The performances of the resulting estimators of the developed model parameters are evaluated and investigated by using a simulation algorithm.

Keywords : binomial distribution, d-optimality, multiple censoring, optimal design, partially accelerated life testing, simulation study
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