Statistical inference for linear degradation and failure time data with masked cause of failure under a step-stress accelerated life test

Firoozeh HAGHIGHI[1]

[1] *Department of Mathematics, Statistics and Computer Sciences, University of Tehran, Tehran, Iran.* haghighi@khayam.ut.ac.ir

In this work, we consider the estimation problem for competing risks intensity parameters when underlying products have a linear degradation path and the cause of failure is possibly masked. A step-stress life test plan is proposed to collect more failure times in a limited test time. A tampered failure rate model is hold to relate the hazard rate of a unit at hight stress level to the hazard rate of that unit at normal stress level. In the proposed plan, no assumptions are made about failure times distribution and the intensity function corresponding to each competing risk is considered to depend only on the degradation level and belong to a specific parametric family. Moreover, we suppose that it is possible the cause of failure being masked. The maximum likelihood estimation of competing risks intensity parameters as well as the observed Fisher information matrix are derived. The proposed method is an alternative method for the estimation of competing risks intensity parameters for the reliable products with linear degradation path proposed by Haghighi and Bae [1]. The advantage of our plan is that the estimators of competing risks parameters have a closed form. A simulation study is conducted to evaluate the performance of the methods and the applicability of the proposed plan is shown by using a real data set.

Keywords: Linear degradation, competing risks, masked cause of failure, step-stress life testing, tampered failure model

References

[1] F. Haghighi and SJ. Bae, ” Reliability estimation from linear degradation and failure time data with competing risks under a step-stress accelerated degradation test,” *IEEE Trans. Reliability*, no.3, pp.960-971, 2015.