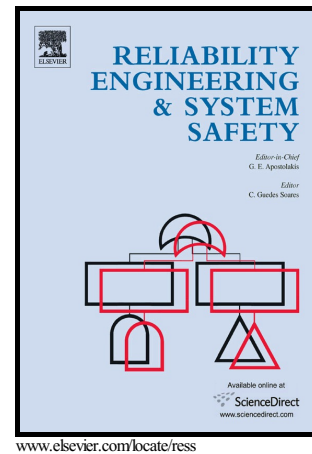


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# Some Reliability Issues for Incomplete Two-Dimensional Warranty Claims Data

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## Abstract

Bivariate reliability and vector bivariate hazard rate or hazard gradient functions are expected to have a role for meaningful assessment of the field performance for items under two-dimensional warranty coverage. In this paper a usage rate based simple class of bivariate reliability function is proposed and various bivariate reliability characteristics are studied for warranty claims data. The utilities of such study are explored with the help of a real life synthetic data.

*Keywords and Phrases* : Usage rate, Censoring, Copula, Reliability, Hazard gradient.

## 1. Introduction

A two-dimensional warranty is characterized by setting warranty limits in a two-dimensional plane where usually one axis symbolizes age and the other usage (Blishke and Murthy [6]). The warranty facility is extended to all those items for which the age and usage respectively fall below the corresponding warranty limits, thus making the warranty field data incomplete. The modelling of such data requires formulation of the problem in bivariate set up, with age and usage being the two variables, which are observed to be strongly positively associated in any empirical study (Gupta et al. [19]). Instead of a direct bivariate modelling, the observed field data may be modelled through a conditional approach, where the joint survival function of age and usage is represented in terms of the survival function and density function of age and usage rate respectively, with the assumption of independence of age and usage

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