

Bayesian multivariate imperfect repair model

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Abstract

This paper generalizes a multivariate imperfect repair model by adapting a Bayesian approach. We concern with modeling a system whose components have specific multivariate distribution of dependent lifelengths. Upon failure, each components undergoes imperfect repair. Different sources of failure which affect the probabilities of perfect and minimal repair are distinguished. Each probability of perfect (minimal) repair is assumed unknown and assigned a prior distribution. Based on the proposed model, we derive the distribution of waiting time between two successive perfect repairs and its corresponding failure rates. We also study some preservation properties for certain nonparametric classes of life distributions and describe the singularity for the resulting distribution.

Keywords and phrases : Perfect repair, minimal repair, replacement, reliability, preservation property.

1. Introduction

Failures make a system or an item more expensive to run. It is of great importance to avoid the failure of an item during actual operation when such an event is costly and/or dangerous. In such situations, one important area of interest in reliability theory is the study of various maintenance policies in order to reduce the occurrence of failure. Perfect repair (or simply replacement) models assume that the item is returned to a "good as new" state immediately after perfect repair. This assumption means that upon repair, an item has the same life distribution as when

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