

Stochastic Analysis of an Operating System with Two Types of Inspection Subject to Degradation

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Abstract

In this paper, two reliability models of a single unit system subject to degradation of the unit are analyzed stochastically and some measures of system effectiveness are obtained by using semi-Markov process and regenerative point technique. In each model, unit may fail completely either directly from normal mode or via partial failure. In Model I, server visits the system immediately whenever needed while in Model II, he appears and disappears from the system randomly. Unit does not work as new after repair and is so called a degraded unit. Two types of inspections are carried out. In type I, server inspects the original unit at its partial failure to see the possibility of on-line repair. If on-line repair is not possible, it is repaired in down state. In type II, the failed degraded unit is inspected to examine the feasibility of repair. If its repair is not feasible, it is replaced by a new one. All random variables are independent and uncorrelated. The distributions of failure time of the unit, time of appearance and disappearance of the server follow negative exponential while that of inspection and repair times are taken as arbitrary. Numerical results for reliability and economic measures of the models are evaluated for a particular case.

Keywords: Stochastic analysis, inspection, degradation, semi-Markov process and regenerative point.

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