

Parameters Estimation of Generalized Linear Failure Rate Semi-Markov Reliability Models

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Abstract. In this paper we will discuss the stochastic analysis of a three state semi-Markov reliability model. Maximum likelihood procedure will be used to obtain the estimators of the parameters included in this reliability model. Based on the assumption that the lifetime and repair time of the system units are generalized linear failure rate random variables, the reliability function of this system is obtained. Also, the distribution of the first passage time of this system will be derived. Some important special cases are discussed.

Key Words : *Linear failure rate distribution, Maximum likelihood estimators, Three state semi-Markov reliability model, System reliability, Operating unit, First passage.*

1. INTRODUCTION

A semi-Markov model has been used by Kao (1974) in some context of hospital administration in the study of the dynamics of movement of patients through care areas in a hospital. El-Gohary (2005) has used the semi-Markov process to describe a reliability system that consists of one active unit, an identical spare, a switch and a repair facility. In this paper it is assumed that the lifetimes of the active repair units are generalized exponentially distributed (El-Gohary(2004), Reinhard and Snoussi(2002) and Kulkarni(1995)).

The stochastic models have many applications in different fields such as reliability systems, social security policy analysis, health care services [3,4,6].

The evolution of many systems naturally ends as the first failure occurs, because external intervention is not practicable. These systems are non-repairable systems. For other systems, generally of high complexity, renewal possibilities exist, and their effectiveness therefore depends not only on their intrinsic reliability but also on the characteristics of maintenance and repair actions.

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