

A new perspective to stress–strength models

Serkan Eryilmaz

Received: 10 December 2007 / Revised: 27 June 2008 / Published online: 11 October 2008
© The Institute of Statistical Mathematics, Tokyo 2008

Abstract The stress–strength models have been widely used for reliability design of systems. In these models the reliability is defined as the probability that the strength is larger than the stress. The analysis is then based on the binary reliability theory since there are two possible states for the system. In this paper, we study the stress–strength reliability in a different framework assigning more than two states to the system depending on the difference between strength and stress values. In other words, the stress–strength reliability is studied under multi-state system modeling. System state probabilities are evaluated and estimated under various assumptions on the system. The multicomponent form is also studied and some results are provided for large systems.

Keywords Minimum variance unbiased estimator · Multi-state system · Stress–strength reliability