

**MULTIMODEL STRESS-STRENGTH UNDER
PATHWAY MODELS**

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Dedicated to Prof. A.M. Mathai on his 80th birth anniversary

Abstract: The reliability of a component or a system under a stress and strength situation is examined when both the stress and strength have distributions with several modes or when both the distributions are convex combinations of other densities. Pathway models are used for the individual components in stress and strength variables. Pathway model is a versatile model which can switch into three different functional forms through a pathway parameter q . When $q < 1$ the model is in a generalized type-1 beta family of functions. When $q \rightarrow 1$ it switches into a generalized gamma family of functions. When $q > 1$ the model is in a generalized type-2 beta family of functions. Under such a versatile model for each component in stress and strength, with different parameters, the reliability of a system is examined. Then special cases of the pathway models, in the independently distributed situations, are studied so that the reliability can be evaluated in explicit forms. Connection to fractional integral is also given.

Keywords: Reliability analysis, stress-strength models, pathway model.

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1. Introduction

In a physical system or in a component in the system let x represent stress and y represent strength then the reliability of the system, or component under consideration, is measured by the probability that $y > x$, that is, $Pr\{y > x\}$. This