

A GENERAL MATHEMATICAL AND STATISTICAL MODEL

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Dedicated to Prof. A.K. Agarwal on his 70th Birth Anniversary

Abstract: A general model in the elliptically contoured family of functions and under the idea of a pathway model is introduced here. Through a pathway parameter b one will be able to go from one family of functions to two other families of functions, thus three different families of functions. A standard form of the model belongs to spherically symmetric family of functions. As particular cases and applications, it is shown that some real multivariate extensions of the basic models of generalized type-1 beta, type-2 beta, gamma, chisquare, Student-t, F, Cauchy, Maxwell-Boltzmann, Raleigh, Gaussian and related densities are available from the general model introduced. Reliability analysis concepts are introduced for the multivariate cases and some properties of the general model are also discussed. Then the model is extended to the complex multivariate case. In the complex case also, various connections and applications are pointed out.

Keyword and Phrases: Multivariate distributions, ellipsoid of concentration, random volumes, multivariate reliability analysis, generalized entropy optimization, generalized Gaussian, Maxwell-Boltzmann, Raleigh distributions, H-function.

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1. Introduction

In this paper the following general notation will be used. Real scalar variables, mathematical as well as random, will be denoted by small letters x, y, \dots . Vector /matrix variables, mathematical and random, will be denoted by capital letters X, Y, \dots . Constant scalars will be denoted by a, b, \dots and constant matrices