

## **A LIFETIME MODEL WITH A BATHTUB AND MODIFIED UPSIDE-DOWN BATHTUB HAZARD RATE FUNCTION**

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### SUMMARY

In this paper, we propose a lifetime distribution which can handle decreasing, increasing, bathtub shaped, and modified upside-down bathtub hazard rate functions. The new three-parameter model is introduced by inserting the generalized exponential distribution of Gupta and Kunda (1999) into Marshall and Olkin's (1997) family. This new distribution, with applications to series and parallel systems in reliability, generalizes the extended exponential-geometric distribution of Adamidis et al. (2005). We shall first study some basic distributional properties of the new distribution. Some closed forms are obtained for its moment generating function, moments, the density function of order statistics, and Rényi entropy. The model parameters are estimated by the maximum likelihood method and Fisher information matrix is discussed. Estimation of the stress-strength parameter is also studied. Finally, an application of the new model is presented using two real data sets and compared with some rival models.

*Keywords and phrases:* Beta generalized exponential distribution; Compounding; Extended exponential-geometric distribution; Marshall-Olkin family; Stress-strength parameter.

*2010 Mathematics Subject Classification:* 60E05, 62E10.