



Model of fatigue failure due to equicorrelated multiple cracks using extended Birnbaum-Saunders distribution)

Ricardo Leiva

F.C.E. Universidad Nacional de Cuyo, Mendoza, Argentina - rleiva@fcmail.uncu.edu.ar

Anuradha Roy*

The University of Texas at San Antonio, San Antonio, USA - Anuradha.Roy@utsa.edu

Rubén Bageta

F.C.A. Universidad Nacional de Cuyo, Mendoza, Argentina - cbageta@fca.uncu.edu.ar

Juan Carlos Pina

Eindhoven University of Technology, Eindhoven, The Netherlands - J.C.Pina@tue.nl

Statement: We propose an extension of the Birnbaum-Saunders distribution to model the more realistic situations where the fatigue failure time of a material is due to the growth of multiple cracks. The properties of the extended Birnbaum-Saunders (EBS) distribution are provided and its purpose to model the fatigue failure time of a material due to the growth of equicorrelated multiple cracks is proposed.

Discussion: The moment estimates (MEs) and the maximum likelihood estimates (MLEs) of the unknown parameters of the EBS distribution based on independent but not identically distributed (i.n.i.d.) random variables are obtained. Monte Carlo (MC) simulations are done to assess the performance of the parameter estimators of the EBS distribution with different number of cracks for different samples.

Summary: Comparisons of the parameter estimates and their standard deviations are made between this new EBS distribution with i.n.i.d. samples and the EBS distribution with i.i.d. samples.

Conclusions: Applications of EBS distribution for i.n.i.d. random variables are feasible and useful in real life.

Keywords: maximum likelihood estimators; moment type estimators; Monte Carlo simulations.