Statistical Engineering Division Seminar

Thursday, April 13, 1995 11:00 am

CAML Conference Room, Technology Bldg., Room B111
NIST
Gaithersburg, MD

Quantile Approach to Accelerated Life (AL) Testing: Probabilistic Models and Data Analysis

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AL tests are conducted under more severe stress conditions than normal, in order to predict life at the normal stresses. An AL model is presented as a scale transformation interpreted as failure mechanism conservation. For the case of constant stress (in time) the simple statistical procedures for validation of a AL model are considered and some real data examples are given. A simple nonparametric procedure (in IFRA class of distribution function) is proposed for time to failure quantile prediction on the basis of reliability models and AL results. For time-dependent stress an AL model is considered also in terms of quanitiles of the time to failure distribution. It is shown that in this case the AL model coincides with the so called Miner's rule, used in fracture mechanics to account for cumulative damage and reliability prediction under different stresses. Some physical considerations regarding the applicability of the AL model with time-dependent stresses are also discussed. A simple algorithm for reliability model parameters estimation for the case of time-dependent stress is discussed.

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