

KOLMOGOROV-SMIRNOV TYPE TESTS FOR NB(W)UE ALTERNATIVES UNDER CENSORING SCHEMES^{*†}

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Abstract

For testing the null hypothesis that a life distribution is exponential against the NBUE (or NWUE) class, the structure of progressively censored TTT statistics is critically examined and incorporated in the study of some linear and Kolmogorov-Smirnov type tests essentially proposed by Koul (1978b) and Kumazawa (1989). Their distribution-freeness property under the null hypothesis (conditionally, under some censoring schemes) is established, and related asymptotics are presented.

1. Introduction. Nonparametric notions of aging have been popular and useful for modeling degradation in performance in a wide variety of contexts ranging from reliability engineering to biomedical applications. Correspondingly, the development and investigation of statistical tests, based on complete or censored life-test observations, for testing the null hypothesis of exponentiality against various aging alternatives has been an active area of research. In particular, the need for statistical inference with *censored data* occur when observing all units in the sample is not feasible.

Among the standard aging notions (viz., Barlow and Proschan 1991), the NBUE (*New Better than Used in Expectation*) is a relatively weak form of aging assumption, often made when one is unwilling to invoke a stronger assumption such as IFR, IFRA or NBU. A continuous life d.f. F on $\mathbf{R}^+ = [0, \infty)$, with a finite mean μ and survival function $\bar{F} = 1 - F$, is said to be (strictly) NBUE if

$$(1.1) \quad \int_t^\infty \bar{F}(x) dx(<) \leq \mu \bar{F}(t), \quad \forall t \geq 0.$$

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