Life Stress Relationship under Harmonics Voltage for Non Linear Loads

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Abstract: Nowadays, reliability life-stress models have been marked under the assumption that stress level must be constant during device performance. But actual models do not work efficiently when stress factor is variable. Thus in this paper is presented a Reliability Life-Stress voltage model which incorporates electrical harmonics effects modeled by compact form of Fourier series. The proposed model is developed by combating Cumulative Damage Model and Inverse Power Law. The parameters of the model are estimated using maximum likelihood. A case study for residential devices with high harmonic generation rate is presented. Since, for an electrical and electronic device failure times follow exponential distribution, in this paper, the time varying stress which based in Markov's properties is traded as equivalent constant stress. The Model application shows the performance of equipment submitted by electrical harmonics and determines the reliability indexes better than constant life-stress relationship. Also solution of the model provides via characterization life how the electrical harmonics affects the device performance and its critical reliable analysis.

Keywords: Reliability, Electrical Harmonics, Inverse Power Law, Time-Varying Stress.