Life Stress Relationship for Electronic Devices Under Time Varying Stress

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Abstract: In this paper, a novel reliability model is presented, which describes the behavior of electronic products under any voltage variation existing in the power line. This work is based on the cumulative damage model with random failures and the cumulative inverse power law relationship. The presented case of study analyzes the effects of the electrical harmonics on electronic devices. Mathematically, the compact form of the Fourier series describes the behavior of the electrical harmonics in the power line. The proposed life stress model determines the reliability indexes better than the classical life-stress relationship model employed for electronic devices. In addition, the proposed model provides via characterization life how the time varying stress can affect the performance of the device and offers a critical reliable analysis under real operational environment. A case study based on LED TV is presented in this paper.

Keywords: Reliability, Time-Varying Stress, Electrical Harmonics, Power Quality