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Reliability Analysis of DC Motors Under On/Off Voltage

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Abstract: Due to electrical variations presented in the power line especially the On/Off voltage variation, the estimated reliability of electronic devices such as DC motors, differs from the real reliability estimations. Thus, in this paper, a reliability analysis that incorporates the analysis the effect of On/Off voltage profiles in the behavior and reliability of DC motors is presented. The proposed model is based on Inverse Power Law model, the Weibull distribution, accelerated life testing and step stress techniques. The parameters of the model were estimated via maximum likelihood. The case study is based on DC motor fan employed in the cooling system of laptop computers; the dc motors are submitted to On/Off voltage stress in cycles of ten seconds during one hour. The solution of the model provides via characterization life how the On/Off stress profile affect the device performance and its critical reliable analysis.

Keywords: Reliability, On/Off cycling stress, Weibull distribution, Inverse Power Law, DC motors.