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Survival analysis of fatigue data: Application of generalized linear models and hierarchical Bayesian model

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Abstract

The survival analysis is introduced to describe the fatigue failure process in this paper for obtaining a set of flexible and accurate probabilistic stress-life (*P-S-N*) curves in fatigue reliability analysis. The generalized linear models (GLMs) are applied as well for expressing a trend and random errors of the *P-S-N* curves simultaneously. A GLM, including a linear Basquin relation and a shape-fixed Weibull hazard function, has been established for the *P-S-N* curves estimation, then a hierarchical Bayesian model is employed to estimate their parameters. The fatigue probability design curves are generated by the survivor function or the resulting predictive distributions. Finally, a comparative example is presented to verify the effectiveness of the method.

Keywords: Fatigue, *P-S-N* curves, Survival analysis, Generalized linear models, Hierarchical Bayesian model

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