

可靠性

基于伪寿命分布的退化数据可靠性评估方法

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摘要:

提出一种利用加速退化数据对产品进行可靠性评估与寿命预测的建模与参数估计方法。首先,针对加速退化数据的特点,建立了加速条件下特征参数退化曲线的连续时间函数模型。进而,结合工程中常用加速模型,建立了加速退化模型参数估计的整体似然函数,并基于Fisher信息阵采用整体推断的极大似然法给出整体模型参数的区间估计。该方法能够有效利用不同加速应力水平下产品退化数据的横向信息,并综合连续时间函数模型对产品退化曲线拟合性强的优点,可提高产品可靠性评估与寿命预测的精度。以某电子产品为例进行了应用实例分析。

关键词: 可靠性 加速退化 伪寿命分布 整体推断

Reliability assessment using constant-stress accelerated degradation data based on pseudo life distribution

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Abstract:

A method based on pseudo life distribution is proposed to evaluate reliability and predict lifetime using accelerated degradation data. Firstly, according to the characteristics of accelerated degradation data encountered in engineering, the analysis method for time continuous performance degradation series is given, and then degradation models for the whole samples are established. Secondly, a reliability function is derived based on the accelerated model, where the unknown parameters of the reliability function are obtained by integral inference with maximum likelihood estimation. The reliability confidence interval is given via Monte Carlo simulation using a Fisher information matrix. With the effective usage of degradation data under different accelerated stress levels as well as the strong adjustment advantages of the time continuous model, the accuracy reliability assessment and lifetime prediction of products are improved and a novel technical way to evaluate of reliability and predict lifetime based on accelerated degradation data is provided. Finally, an example is presented which can illustrate the performance of the proposed method.

Keywords: reliability accelerated degradation pseudo life distribution integral inference

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