

## 系统工程

### 基于比例风险模型的可靠性综合评估

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摘要:

研究了环境因素对可靠性的影响, 提出了一种利用变环境数据的可靠性综合评估方法。首先, 利用比例风险模型描述产品可靠性水平与其工作环境因素的定量影响关系。接着, 利用变环境数据确定基准失效率, 并对比例风险模型进行变换。然后, 利用广义线性模型给出了可靠性模型参数的极大似然估计。进而结合可靠性模型, 利用似然比方法给出了可靠度置信下限。实例表明, 该方法能较好地度量环境因素对产品可靠性的影响, 从而提高了可靠性评估精度。

关键词: 系统工程 可靠性评估 比例风险模型 广义线性模型

## Integrated reliability assessment based on proportional risk model

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Abstract:

The test results are always extrapolated from the test conditions to the usual usage conditions for reliability assessment. To improve the reliability assessment precision under varied environment conditions, a method of integrated reliability assessment based on proportional risk model is proposed. In this method, the proportional risk model is introduced to describe the relations between reliability and environment factors. According to the data analysis or experience, the proportional risk model is reestablished. Then the log-likelihood function is treated as a generalized linear expression of Poisson variables, in which the indicator is described as a Poisson variable. With the generalized linear model, the maximum likelihood estimations of the model coefficients are obtained. Thus the influences of environment factors on the reliability of the product are measured quantificationally. The instance analysis shows that this integrated reliability assessment method improves the precision of reliability assessment using the varied environment test data synthetically and is straightforward for engineering application.

Keywords: systems engineering reliability assessment proportional risk model generalized linear model

收稿日期 修回日期 网络版发布日期

DOI: 10.3969/j.issn.1001-506X.2010.10.25

基金项目:

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