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随机结构响应量置信区间的一种求解方法

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Confidence Interval Analysis for Response Variable of Random Structure

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摘要

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摘要 基于经典的可靠性分析方法和非正态变量向正态变量的等价变换,提出了随机结构响应量置信区间估计的一种迭代方法,该方法可用于复杂响应量函数或隐式响应量函数的置信区间分析。在采用有精确解的算例验证了所提方法的有效性后,将所提方法用于2个工程实例,对10杆结构中的位移函数和某型飞机翼身连接接头模型中的响应面函数进行了置信区间估计,所提方法的计算结果与数值模拟方法计算结果的对照表明:所提方法计算工作量小且计算精度高。

关键词: 可靠性 置信度 置信区间 随机结构 响应量

Abstract: Based on the classic reliability analysis method and the equivalent transformation from non-normal random variable to normal random variable, an iterative method is presented for confidence interval analysis of random structure response variable, which is the complicated or implicit function of the basic random variables in general cases. Three examples with accurate solutions illustrate the precision and the validity of the presented method. Then the presented method is applied to analyze two engineering examples, *i.e.*, the displacement function of ten-bar truss structure and the response function of the wing-fuselage joint structure of an aircraft. Compared with the numerical simulation method, the presented method shows virtue of less computation effort and higher precision.

Keywords: reliability confidence confidence interval random structure response variable

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