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疲劳关键件加速腐蚀因子可靠性分析

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Reliability Analysis of Accelerated Corrosion Factor for Fatigue Critical Components

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摘要

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摘要 针对腐蚀条件下飞机结构疲劳寿命分析和评定问题,对疲劳关键件加速腐蚀因子进行了研究。以疲劳寿命作为疲劳关键件的腐蚀量,定义加速腐蚀因子为疲劳寿命相等时的服役时间与加速时间的比。假定疲劳寿命服从对数正态分布、疲劳寿命随腐蚀时间呈指数变化,推导得到了加速腐蚀因子的表达式以及加速腐蚀因子与腐蚀时间无关的结论;得到了加速腐蚀因子估计量的分布,对其进行了可靠性分析。并进行了典型结构模拟试件大气暴露和试验室加速腐蚀因子的可靠性分析。

关键词: 加速因子 加速腐蚀 疲劳寿命 腐蚀 预腐蚀 可靠性 飞机结构

Abstract: To evaluate the fatigue life for aircraft structures in corrosive environment, the reliability analysis of accelerated factor for accelerated aging test to service or natural exposure environment on fatigue critical components is performed. The accelerated factor is defined as the ratio of service time to accelerated time corresponding to the same pre-corrosion fatigue life. According to corrosion kinetics law on the pre-corrosion fatigue life, equations for accelerated factor are established. The accelerated factor is proved to be a constant regardless of reliability degree and corrosion time. The distribution of accelerated factor estimate is gained, so the confidence intervals of accelerated factor for LY12CZ aluminum alloys specimen are obtained.

Keywords: accelerated factor accelerated corrosion fatigue life corrosion pre-corrosion reliability aircraft structure

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