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基于临界面法的多轴疲劳损伤参量的研究

尚德广, 姚卫星

南京航空航天大学飞行器系

STUDY ON MULTIAXIAL FATIGUE DAMAGE PARAMETERS BASED ON THE CRITICAL PLANE APPROACH

SHANG De guang, YAO Wei xing

Department of Aircraft, Nanjing University of Aeronautics and Astronautics, Nanjing, 210016, China

摘要

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摘要 以薄壁管拉扭疲劳试件为研究对象, 在分析多轴损伤临界面上的应力与应变变化特性的基础上, 根据多轴疲劳临界损伤平面原理, 利用多轴临界面上的剪切应变幅与相邻两个最大剪切应变值 γ_{max} 之间的法向应变幅 ϵ_n 作为形成多轴疲劳损伤参量的主要参数, 提出基于拉伸和剪切两种形式的多轴疲劳损伤参量。所提出的多轴疲劳损伤参量不含有任何材料常数, 并可同时适用与多轴比例与非比例加载情况, 且可退化成单轴的形式。

关键词:

Abstract: The tension torsion thin walled tube specimens were used as the researching object. On the basis of analyzing the varying characteristics of the stress and strain on the multiaxial critical plane, the maximum shear strain amplitude and normal strain excursion between adjacent turning points of the maximum shear strain on the critical plane were used as two main parameters of controlling the multiaxial fatigue. Two kinds of multiaxial fatigue damage parameters of the tension mode and shear mode are proposed, which do not include any material constant in damage parameters, and may be used under either proportional loading or nonproportional loading. The given multiaxial fatigue damage models by means of the presented damage parameters were used to predict multiaxial fatigue life, and the results are satisfactory by two kinds of material experimental verifications.

Keywords:

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