航空学报 » 2011, Vol. 32 » Issue (11) :2036-2041 DOI: CNKI:11-1929/V.20110419.1703.007

缺口件振动疲劳寿命分析的名义应力法

李德勇[1,2], 姚卫星[1]

1. 南京航空航天大学 飞行器先进设计技术国防重点学科实验室, 江苏 南京 210016;
2. 成都飞机设计研究所, 四川 成都 610041

Nominal Stress Approach for Life Prediction of Notched Specimens Under Vibration Loading

LI Deyong[1,2], YAO Weixing[1]

1. Key Laboratory of Fundamental Science for National Defense-Advanced Design Technology of Flight Vehicles, Nanjing University of Aeronautics and Astronautics, Nanjing 210016, China;
2. Chengdu Aircraft Design & Research Institute, Chengdu 610041, China

摘要 为了描述缺口根部应力均方根(RMS)的集中程度,给出了缺口件在动态载荷激励下的应力均方集中系数的定义及其计算公式。基于结构疲劳的基本机理,通过考察缺口根部应力均方根的分布特点,给出了疲劳缺口系数的计算公式,形成了缺口件振动疲劳寿命分析的名义应力法。通过3个算例的计算结果表明,本文提出的方法能很好地预测缺口件的振动疲劳寿命。

关键词: 振动疲劳 寿命预测 名义应力法 应力均方集中系数 缺口疲劳系数

Abstract: To describe the centralized level of the stress root mean square (RMS) around a notch, this paper proposes a definition and calculation formula of the stress mean square concentration factor for notched specimens under dynamic excitation. A calculation formula for notch fatigue factor is presented based on the basic fatigue mechanism of structures and a consideration of the distribution characteristics of the stress root mean square in dangerous regions around a notch. Consequently the nominal stress approach for the life prediction of notched specimens under vibration loading is obtained. The results of three typical examples show that the method proposed in this paper can predict the vibration fatigue life of notched specimens well.

Keywords: vibration fatigue life prediction nominal stress approach stress mean square concentration factor notch fatigue factor

Received 2011-01-24;

Fund:

611所航空基金(C1007-011)

Corresponding Authors: 姚卫星 Email: wxyao@nuaa.edu.cn

About author: 李德勇(1985-) 男,助理工程师。主要研究方向:结构振动疲劳分析。 E-mail: leaderyong@126.com 姚卫星(1957-) 男,博士,教授,博士生导师。主要研究方向:飞行器结构设计。 Tel: 025-84892177 E-mail: wxyao@nuaa.edu.cn

引用本文:

李德勇, 姚卫星. 缺口件振动疲劳寿命分析的名义应力法[J]. 航空学报, 2011, 32(11): 2036-2041.

LI Deyong, YAO Weixing. Nominal Stress Approach for Life Prediction of Notched Specimens Under Vibration Loading[J]. Acta Aeronautica et Astronautica Sinica, 2011, 32(11): 2036-2041.