

Advances
in
Aircraft Structures

Editor

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Chapter 8

Fatigue Damage Characterization of Aluminum Alloy Plates

Meftah Hrairi, Masturah Mohamad, Siti Maisara Ismail

Abstract

This study investigated the initiation and propagation of cracks until fracture of aluminum alloy 7075 under cyclic loadings. Tests were conducted to generate fatigue failures from 1×10^3 to 4×10^4 cycles at 10 Hz. Ultrasound nondestructive technique was used to detect the presence of crack as well as its growth. Finite element analysis was conducted in order to assess the ability to predict fatigue crack initiation behavior. Surface roughness measurement was also done to enhance and give better explanation to the numerical and experimental results. The results obtained from fatigue test were compared with those obtained using ANSYS and a good agreement between the two was observed.

Keywords: *Fatigue; ultrasound; finite element; aluminium.*

1. Introduction

The detection of micro-cracks or the degradation of strength of materials during service is of substantial importance especially in critical components like aircraft structures. The development of new, practical, and reliable nondestructive techniques and methodologies to both qualitatively and quantitatively assess the state of structural fatigue damage accrued and stored in the material itself is very