Advances in Aircraft Structures

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Chapter 28

The Equilibrium Gap Method

Syed Muhammad Kashif

Abstract

This chapter discusses the equilibrium gap method that utilizes full field data measured over a surface. The method has been shown to give promising results for identification of elastic constitutive properties. Also, the method has been applied to the case of a damaged specimen. Initial trial values of unknown data is given as input and then the gap between actual and numerical result is reduced.

***Keywords**: Equilibrium gap method, damage identification, full field data.*

1. Introduction

The Equilibrium Gap Method (EGM) , has been proposed and developed to identify elastic fields or a damage field by making use of a measured displacement field in Ω. (Claire et al, 2002, Claire et al, 2004) The approach is valid for the cases where the constitutive heterogeneity is in the form of a scalar and isotropic damage field $D(x)$, (Lemaitre, 1990). In this case of damage description, the Poisson's ratio remains constant contrary to the Lamé coefficients which can be written as $\lambda(x) = \lambda_0[1 - D(x)]$ and $\mu(x) = \mu_0[1 - D(x)]$ where λ_0 and μ_0 are the coefficients of the undamaged material.