Advances in Aircraft Structures

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CONTENTS

Structural Instability

Structure Analytical Methods

Chapter 31
Numerical Construction of Piecewise Virtual Fields

Syed Muhammad Kashif

Abstract

This chapter discusses the numerical issues in construction of piecewise virtual fields over a specimen. The improvement and advantages over the use of single virtual element has been examined. Such a piecewise construction has been successfully used to characterize a thin composite plate in bending. Moreover, the use of piecewise elements has shown its merits in the characterization of a damaged composite plate. An illustrated detailed discussion is presented on the choice of element that ensures continuity at the edges of adjacent elements and its importance.

***Keywords**: piecewise virtual elements, slope continuity Hermite16 element.*

1. Introduction

With the use of virtual fields method, the unknown parameters can be directly identified by making use of special virtual fields or specifically special virtual deflection fields $w^{*\alpha}$ (with $\alpha = a, b, c, d, e, f$) while writing external virtual work as per principle of virtual work (refer to Eq.1).

$$[D_{ij}] = \sum_{i=1}^{n} [F_i \cdot w_i^{*\alpha}] \qquad (1)$$