

**Advances**  
**in**  
**Aircraft Structures**

**Editor**

**Jaffar Syed Mohamed Ali**

**Erwin Sulaema**



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# 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).

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