

Growth of transverse cracks from multiple adjacent debonds: debond-debond interaction between rows of partially debonded fibers in UD composites

Luca Di Stasio^{a,b}, Janis Varna^b, Zoubir Ayadi^a

^aUniversité de Lorraine, EEIGM, IJL, 6 Rue Bastien Lepage, F-54010 Nancy, France

^bLuleå University of Technology, University Campus, SE-97187 Luleå, Sweden

Abstract

The effects of crack shielding, fiber content and ratio of 0° to 90° ply thickness on fiber/matrix debond growth in thin cross-ply laminates are investigated with Representative Volume Elements (RVEs) of different ordered microstructures. Debond growth is characterized by the estimation of the Energy Release Rates (ERRs) using the Virtual Crack Closure Technique (VCCT) and the J-integral. It is found that

Keywords: Polymer-matrix Composites (PMCs), Thin-ply, Transverse Failure, Debonding, Finite Element Analysis (FEA)

1. Introduction

Since the development of the *spread tow* technology or “FUKUI method” [1, 2], significant efforts have been directed toward the characterization of *thin-ply* laminates [3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15] and their application to mission-critical structures in the aerospace sector [16, 17, 18, 19].

2. RVE models & FE discretization

2.1. *Models of Representative Volume Element(RVE)*

2.2. *Finite Element (FE) discretization*

10 3. Results & Discussion

4. Conclusions & Outlook

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