Advances in Aircraft Structures

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Mode I Delamination Simulation Using LS-DYNA

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Abstract

There are several failure models that can be used to predict delamination and these include stress based failure models, fracture mechanics and damage mechanics. The damage mechanics combines the advantages of stress based and fracture mechanics into a single failure model. In LS-DYNA the damage mechanics based failure models are available through material models MAT_138 and MAT_186. These two failure models were tested using a DCB specimen to investigate mode I delamination. Results are presented on the accuracy of both the failure models.

***Keywords**: delamination, damage mechanics*

1. Introduction

Delamination is essentially separation of adjacent layers within a laminated structure. There are different fracture modes that lead to delamination and these include peeling, shear and mixed mode (Armas, C.A.L., 2008). Delamination can be predicted numerically using stress based failure models, fracture mechanics approach and damage mechanics based failure models. A stress based failure model employs a failure polynomial to predict delamination. However, stress based failure models are reported to be a good indicator to predict delamination