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Modelling the damage evolution in notched Omega Stiffened Composite Panels under compression.☆

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Abstract

In this paper, the compressive behaviour of an omega stiffened composite panel with a large notch damage has been investigated. The influence of intra-laminar and inter-laminar damage onset and evolution on the compressive behaviour of a stiffened panel, characterised by a cut-out located in the middle bay and oriented at 45° with respect to the load direction, has been studied. A numerical model, taking into account delamination and fibre-matrix damage evolution, respectively, by means of cohesive elements and Hashin's failure criteria together with material degradation rules, has been adopted. By comparing the performed numerical analyses, taking into account intra-laminar and inter-laminar damages, the effects of the interaction between delaminations and fibre-matrix damage in the large notch area on the global compressive behaviour of the omega stiffened composite panel have been assessed and critically discussed.

Keywords: Intra-laminar damage; Large notch damage; Finite element model; Delamination; Cohesive model.

1. Introduction

In the recent years, composite materials have driven scientific and technological developments in several engineering areas. Indeed, the high strength and stiffness, as well as the durability and the versatility, are the main reasons for their employment for structural applications especially in

☆ The results of this work have been presented at the International Symposium on Dynamic Response and Failure of Composite Materials, Draf2016, Ischia, Naples, 6-9 September, 2016

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