A COMPARATIVE STUDY FOR THE PROGRESSIVE FAILURE ANALYSIS OF DOUBLE-NOTCHED GLASS/EPOXY COMPOSITE LAMINATES

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This work presents a comparative study for the progressive damage analysis of double-notched glass/epoxy composites with layups [90/0]_s and [45/90/-45/0]_s. The material property degradation method (MPDM) is used to model the intra-lamina failure whereas cohesive elements (CE) are employed to account for the delamination at the interfaces. Different fracture mechanics-based and continuum damage mechanics-based failure theories are considered in the MPDM-CE approach and a comparative study of these failure theories is presented. The predictions are compared with the experimental results reported by Hallett and Wisnom [2006]. Reasonably good agreement between experiment results and simulation results is obtained, showing that the MPDM-CE approach can effectively predict the progressive failure in double-notched glass/epoxy composite laminates. Furthermore, it is significantly revealed that a modification scheme for the progressive failure modeling of fiber failure may be necessary to improve the strength prediction of notched composites.

Keywords: progressive failure; double-notched composite; material property degradation method (MPDM); cohesive element, failure criterion.

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