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Abstract

Numerical simulations can help in the understanding of the damage sequence of polymer based composite laminates during an impact event, which is a difficult experimental task when dealing with a large number of plies. Low velocity impact and compression after impact in thin ply fabric laminates are studied through numerical simulations in which special attention has been devoted towards the computational efficiency. The impact results show the importance of delamination during the damage initiation, which takes place at few interfaces. After damage initiation, delamination and fiber breakage propagate until a last stage which is mainly governed by fiber breakage. Compression after impact shows a brittle behaviour with almost no damage propagation prior to failure. The numerical models indicate that matrix cracking effects can be assumed negligible for the studied thin ply laminates while delamination and especially the fiber constitutive law shape are important for accurate predictions.

Keywords: Impact behaviour, Compression after impact, Finite element analysis, Polymer-matrix composites

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