
Scale and stacking effects of laminated composite plates with geometric singularities : A critical numerical/experimental comparison

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Abstract

This paper presents a comprehensive numerical/experimental comparison to analyze both the scale and stacking effects of laminated composite containing geometric singularities. The numerical simulation was carried out with the new mesomodel-based approach presented in the previous work. Numerical results demonstrate the robustness of this approach, showing a very good correlation with experimental data for both typical singular cases in the aeronautic industry : holed and V-notched laminates. The complex subcritical damage process is accurately reproduced by the new split approach modeling, including the sudden appearance of local instabilities and final rupture for all dimensional effects in the plane, stacking sequences (including effects due to an increased number of plies), and ply thickness. The physical nature of these effects has been identified. They inevitably influence the propagation of splits, which is the origin of stress relaxation around singularities and the orientation of delamination along adjacent interfaces, thus significantly impacting the complex evolution of subcritical damage.

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