

Experimental analysis and damage modeling of the shear-out failure mode of a 3D woven composite lug

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This study focuses on the shear-out failure mode of a 3D-woven composite lug. The damage scenario leading to the failure is analyzed based on a tensile test on a lug. The shear-out failure of the lug is shown to be driven by matrix damages generated by in-plane shear. No yarn failure is observed. A matrix damage model is proposed to capture the shear-out failure of the lug. This model combines the Onera Damage Model for Polymer Matrix Composite (ODM-PMC) with a Mazars-like damage evolution law. A special attention is paid for the transition between both evolution laws, in order to ensure the continuity of the damage evolution. The model is implemented into the commercial Abaqus Standard finite element (FE) software. A 3D FE analysis of the shear-out failure of the lug is performed. The simulation is able to reproduce the load plateau observed in the global behavior of the lug as well as the specific matrix damage patterns.