A finite element model of delamination in cross-ply laminates

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A finite element model was developed for the modelling of progressive delamination in a cross-ply laminate made of polymer composite layers with continuous fibres. Three-dimensional solid elements were used to model the orthotropic layers in the macromechanical model. The delamination was initiated by a sharp notch, which was placed at the center part of a rectangular composite plate. The in-plane load was tension, applied incrementally in time. The delamination process was modeled by the help of a meso-scale finite element model, and special interface elements were used in the vicinity of notch tip between the layers. The solid interface elements with special material behavior were applied to model damage progression during the delamination of layers. The analysis predicted a narrow delamination zone at the notch tip, also verified by experimental measurements.

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