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Peridynamic analysis of fibre-matrix debond and matrix failure mechanisms in composites under transverse tensile load by an energy-based damage criterion

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Abstract

Reliable simulation methods and failure criteria are required during the sizing of fiber reinforced plastics (FRPs). Peridynamics (PDs) is a promising numerical method to predict the evolution and interaction of damages. In the current text a novel energy-based failure criterion for linear peridynamic solid (LPS) materials is implemented and applied to the micromechanical damage of FRP structures. The novel criterion promises a more realistic reproduction of failure modes for ductile materials, a reduced mesh dependecy and only requires physically measurable parameters. The results of the novel criterion are compared to a reference criterion and are evaluated against experimental observations.

Keywords: Peridynamics, Failure criterion, FRP, RVE, Fibre-matrix debonding

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