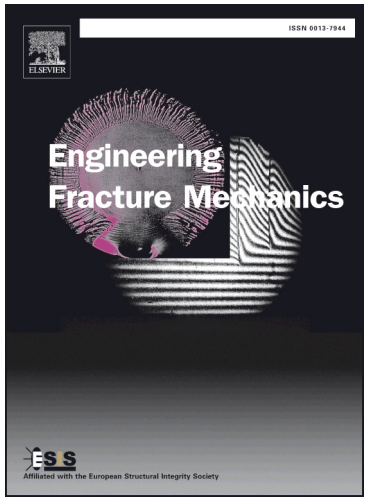

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Analyzing dynamic fracture process in fiber-reinforced composite materials with a peridynamic model

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ABSTRACT

A bond-based peridynamic model was developed to study in-plane dynamic fracture process in orthotropic composites. The peridynamic material constant was extended to a continuous micromodulus C_θ for orthotropic materials. C_θ changes continuously from the fiber direction to the transverse direction with an effective orthotropy. Moreover, this model is the first to simulate the impact dynamic fracture process using simultaneous crack-velocity-related dynamic toughness. Besides the final failure status, the fracture process and crack velocity can be predicted more accurately by using the simultaneous dynamic fracture energy. The simulation was validated by comparison to the experimental results.

Keywords: Fiber reinforced composites; Peridynamic modeling; Dynamic fracture; Impact loading; Crack velocity.