

Crack propagation criterion for a pre-stressed elastic composite subjected by tangential forces

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We study the incremental fields of a cracked fiber-reinforced elastic material subjected to Mode II of fracture with initial stresses.

For a Mode II crack contained in a pre-stressed orthotropic or isotropic elastic material we determine the critical values of incremental tangential stresses which produce crack propagation, as well as the direction of crack propagation.

We assume the validity of Sih's fracture criterion also for a pre-stressed orthotropic and isotropic materials, replacing strain energy density by the incremental strain energy density.

Also we study the behavior and the interaction of two collinear cracks in a pre-stressed, orthotropic, linear elastic material representing a fiber reinforced elastic composite.

Following Guz's representation theorem of incremental fields, the theory Riemann-Hilbert problem and assuming that the initial stresses have a constant value we solve our mathematical problem. Using the asymptotical values of incremental fields near the crack tips, Irwin's relation giving the energy release rate and Griffith's energetic criterion, we determine the critical values of incremental tangential stresses that producing crack propagation.