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An asymmetrical dynamic model for bridging fiber pull-out of unidirectional composite materials. (English) [Zbl 1293.74062](#)

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Summary: An elastic analysis of an internal crack with bridging fibers parallel to the free surface in an infinite orthotropic elastic plane is studied. An asymmetrical dynamic model for bridging fiber pull-out of unidirectional composite materials is presented for analyzing the distributions of stress and displacement with the internal asymmetrical crack under the loading conditions of an applied non-homogenous stress and the traction forces on crack faces yielded by the bridging fiber pull-out model. Thus the fiber failure is determined by maximum tensile stress, resulting in fiber rupture and hence the crack propagation would occur in a self-similarity manner. The formulation involves the development of a Riemann-Hilbert problem. Analytical solution of an asymmetrical propagation crack of unidirectional composite materials under the conditions of two moving loads given is obtained, respectively. After those analytical solutions were utilized by superposition theorem, the solutions of arbitrary complex problems could be obtained.

MSC:

74E30 Composite and mixture properties

74R10 Brittle fracture

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Keywords:

an asymmetrical dynamic model; bridging fiber pull-out; unidirectional composite materials; analytical solutions; crack

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