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An enhanced beam-theory model of the mixed-mode bending (MMB) test. I: Literature review and mechanical model. (English) Zbl 1293.74256

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Summary: The paper presents a mechanical model of the mixed-mode bending (MMB) test used to assess the mixed-mode interlaminar fracture toughness of composite laminates. The laminated specimen is considered as an assemblage of two sublaminates partly connected by an elastic-brittle interface. The problem is formulated through a set of 36 differential equations, accompanied by suitable boundary conditions. Solution of the problem is achieved by separately considering the two subproblems related to the symmetric and antisymmetric parts of the loads, which for symmetric specimens correspond to fracture modes I and II, respectively. Explicit expressions are determined for the interfacial stresses, internal forces, and displacements.

MSC:

74K10	Rods (beams, columns, shafts, arches, rings, etc.)
74-05	Experimental work for problems pertaining to mechanics of deformable solids
74E30	Composite and mixture properties
74-02	Research exposition (monographs, survey articles) pertaining to mechanics of deformable solids

Keywords:

mixed-mode bending (MMB) test; beam-theory model; analytical solution; laminated composite; interlaminar fracture toughness; delamination

Full Text: DOI

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