Wang, J.; **Karihaloo, B. L.**

Cracked composite laminates least prone to delamination. (English) Zbl 0790.73050

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By solving integral equations resulting from the use of Fourier transforms, the authors obtained an analytical solution for a $[(\pm\theta)_{n2}/(90^\circ)_{n1}/(\mp\theta)_{n2}]$ laminate containing a partial transverse matrix crack in the $(90^\circ)_{n1}$ layer when the boundary surfaces of the laminate are subjected to a uniform shear load. The problem is a generalization of the well-known problem in fracture mechanics where a homogeneous strip of finite width $2d$ containing a central crack of length $2a$ ($2a < 2d$) is subjected to shear load. For the present problem, mode II stress intensity factor at the crack tip is calculated and its dependence on laminate parameters is examined. An optimization procedure is developed (and numerical results are obtained) to minimize the stress intensity factor. An alternative optimization procedure seeks to minimize the largest interfacial principal tensile stress. The physical or experimental basis of the latter criterion is not clear.

Reviewer: W.-L.Yin (Atlanta)

MSC:

74E30 Composite and mixture properties
74R99 Fracture and damage

Keywords:

integral equations; Fourier transforms; analytical solution; matrix crack; mode II stress intensity factor; crack tip; optimization procedure

Full Text: DOI