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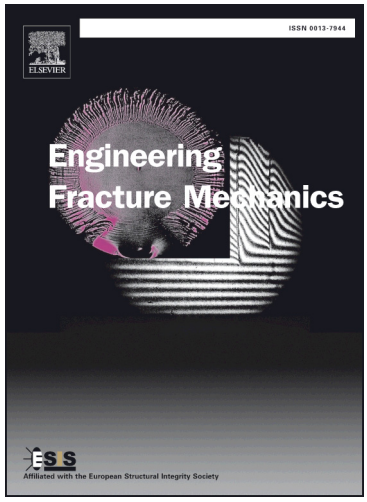

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Stress intensity factors for fibrous composite with a crack embedded in an infinite matrix under a remote uniform load

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Abstract

The interaction between a crack and two circular elastic inclusions for a fibrous tri-material composite under a remote uniform load is investigated. Based on the method of analytical continuation combined with the alternation technique, the solutions to the cracked composite are derived. A rapidly convergent series solution for the stress field, either in the matrix or the fibers, is obtained in an elegant form. The stress intensity factors are obtained numerically in terms of the dislocation density functions of the logarithmic singular integral equations. The merit of the present approach is the formulation of weakly singular integration that the integrals involved in the weakly singular allow easy calculations in the singular integral equation which can be treated to solve the problem even when a crack is closer to the interface. The stress intensity factors as a function of the dimensionless crack length for various material properties and geometric parameters are shown in graphic form. It is shown that the fibers act to restrain or accelerate crack growth depending on the shear moduli

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