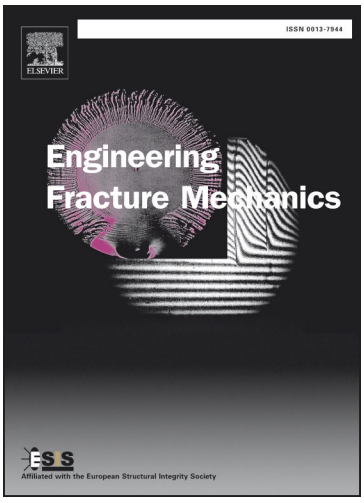

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Integral Equation Analysis for Cracked Strip of Orthotropic Functionally Graded Material

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Abstract

In this paper, the integral equations are formulated and solved numerically for a cracked orthotropic strip with Functionally Graded Materials (FGMs) subjected to both static and dynamic loads. The Green's function of displacement discontinuity in an orthotropic FGM strip is derived by using the Fourier transform and the Laplace transform techniques with the shear modulus and the mass density varying exponentially, and constant Poisson's ratio for functionally graded materials. It has been shown that the transformed Green's solutions have the same order of singularities as that in the static case. The normalized time-dependent stress intensity factors are obtained with the Durbin's inversion method for the Laplace transform. The static stress intensity factors are compared with the results given by finite element analysis and excellent agreements are achieved.

Key words: Displacement dislocation, Green's function, functionally graded material, integral equation method, stress intensity factor.

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