

Analytical Solution of the Crack Problem for the Inhomogeneous Materials Taking into Account the Independent Changes, as the Elastic modulus and Poisson's ratio

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This paper examines the problem of a Mode I crack in an inhomogeneous elastic plane and space. It is assumed that the elastic modulus and Poisson's ratio vary arbitrarily with the coordinate perpendicular to the line (plane) of the crack. The problem is reduced to a dual integral equation. Approximate analytical solutions are obtained. The developed methods allow to obtain analytical solution with presupposed accuracy. Expressions for the displacements, normal components of stress and stress intensity factor and stress field are derived. The effect of the inhomogeneity is examined for functionally graded materials with complicated structure.