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Solutions of Solid Cracks With Mohr Coulomb Fracture Criterion by Indirect Boundary Element Method

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Extended Abstract

In this study, the influence functions of displacement discontinuity and FSM in isotropic elastic medium are obtained and applicated to Mohr- Coulomb element. With this purpose, Kelvin fundamental solutions for isotropic medium on infinite planes are used to form dipoles from singular loads, and the various combinations of the said dipoles are used to obtain the influence functions of displacement discontinuity [1]. In the discontinuity elements that established a joint, which can be considered as a thin crack with a compressible filling. A more realistic model would include a constraint between the normal and shear stresses transmitted across the joint, so that inelastic deformations are possible. Such a constraint for a typical element is given by Mohr-Coulomb condition. So this result it can be obtained slip length.

In this study, boundary element equations were formulated by deriving the influence functions of displacement discontinuity in an isotropic elastic medium. For the solution of two-dimensional elastic fracture problems, a Displacement Discontinuity Method (DDM) formulation was used in conjunction with the Fictitious Stress Method (FSM). These two different boundary element equations were applied together to crack problems, and the effectiveness of this method was investigated.

An elastic joint element can be considered as a long, thin crack with a compressible filling. A segment of a joint can then be modelled as an elemental displacement discontinuity whose opposite surfaces are connected by a spring, with the normal Kn and shear Ks stiffnesses of the spring chosen to be representative of the properties of the joint filling material [2].

A circular and rectangular holes in an infinite medium with a horizontal joint have been analysed by means of DDM and FSM. Since the vertical line through the centre of the opening is a line of symmetry with respect to the geometric boundary and loading conditions, a condition of half symmetry was employed.

For the uniaxial stress field problem the results of stress on the joint are investigated. The slip length was obtained approximately the circle radius. The results of this study were compared with the results of Reference [3]. It was seen that slip length are very closer to the result of Reference [3].

References

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