

Analysis of Three-Dimensional Cracks in an Isotropic Medium by the Semi-Analytical Method

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Abstract : We presume a cylindrical medium that is under a uniform loading and there is a penny shaped crack located in the center of cylinder. In the crack growth analysis, the Stress Intensity Factor (SIF) is a fundamental prerequisite. In the present study, according to the RITZ method and by considering a cylindrical coordinate system as the main coordinate and a local polar coordinate, the mode-I SIF of three-dimensional penny-shaped crack is obtained. In this method the unknown coefficients will be obtained with minimizing the potential energy that is including the strain energy and the external force work. By using the hook's law, stress fields will be obtained and then by using the Irvine equations, the amount of SIF will be obtained near the edge of the crack. This question has been solved for extreme medium in the Tada handbook and the result of the present research has been compared with that.

Keywords : three-dimensional cracks, penny-shaped crack, stress intensity factor, fracture mechanics, Ritz method

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