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# Frictionless Contact of a Rigid Disk with the Face of a Penny-Shaped Crack in a Transversely Isotropic Solid

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## Abstract

In the framework of linear elastic **continuum** mechanics, an analytical formulation is presented for the axisymmetric axial interaction of a rigid disk in frictionless contact with the face of a penny-shaped crack in a transversely isotropic solid. The problem is reduced to an integral equation and is shown to be degenerated to the formulation of isotropic materials in the literature. As the closed-form solution is not possible, by means of a numerical procedure, the obtained integral equation is solved and the accuracy of numerical procedure and mathematical formulation is verified through comparison with the available results for the relevant analysis in isotropic solids. Through several numerical displays, the effect of material anisotropy on the stiffness of the interacting system and the stress intensity factors at the tip of penny-shaped crack is surveyed.

*Keywords:* Penny-shaped crack; Rigid disc; Transversely isotropic; Integral equation; Stress intensity factor.

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## 1. Introduction

When external loads are applied to a solid, the stress transfer leads to the deformation of the medium which presents no difficulty in the continuum

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