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Poroelastic solutions in transversely isotropic media for wellbore and cylinder. (English)

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Summary: This paper presents closed-form solutions for pore pressures and stress fields for inclined boreholes and cylinders, induced by boundary stress perturbation in an anisotropic poroelastic medium. The governing equations for transversely isotropic poroelastic materials are presented in the cylindrical coordinate system. The solution for the inclined boreholes, subjected to a three-dimensional far-field anisotropic stress field, is derived with the borehole generator coinciding with the material axis of symmetry, while the solutions for the cylinders are obtained under various loading conditions that are encountered in laboratory testing procedures. The analysis shows, in addition to the effect of time on stress and pore pressure variations, that poromechanical anisotropic material coefficients also play an important role in calculating the in-plane stress fields, which is not the case using the classical anisotropic theory of elasticity.

MSC:

[74E05](#) Inhomogeneity in solid mechanics
[76S05](#) Flows in porous media; filtration; seepage
[86A20](#) Potentials, prospecting

Cited in **11** Documents

Keywords:

[cylindrical coordinate system](#); [three-dimensional far-field anisotropic stress field](#); [material coefficients](#); [in-plane stress fields](#)

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