

Boundary Integral Method in the Theory of Double-Porosity Materials

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ABSTRACT: This paper concerns with the dynamical full coupled theory of poroelasticity for double-porosity materials. The governing full coupled linear PDEs are presented. This theory is straightforward generalization of the earlier proposed theories of consolidation with double porosity.

In this paper the basic boundary value problems (BVPs) of steady vibrations are investigated by means of boundary integral method. Some basic results of the classical mathematical theories of poroelasticity are generalized and the following results are obtained: the properties of plane harmonic waves are established, the fundamental solutions of equations of steady vibrations are constructed, the Green's formulae in the considered theory are obtained, the uniqueness theorems of the internal and external BVPs are proved, the representation of Galerkin type solution is obtained, the basic properties of the surface and volume potentials and singular integral operators are established, and finally, the existence theorems for the internal and external BVPs are proved by means of the boundary integral method and the theory of singular integral equations.