

Boundary Integral Method in the Theory of Bone Thermoporoelasticity

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The concept of porous media is used in many areas of engineering and applied science (e.g., biology, biophysics, biomechanics). The double porosity model would consider the bone fluid pressure in the vascular porosity and the bone fluid pressure in the lacunar-canalicular porosity. It is an effective and useful model for deformation-driven bone fluid movement in bone tissue (for details, see [1], [2] and references therein).

In the present paper, we shall consider the linear theory of bone thermoelasticity. The system of equations of this theory is first set up starting from the equations of the theory of thermoelasticity for solids with double porosity [3] and the following results are obtained: the fundamental solution of equations of steady vibrations is constructed by means of elementary functions and its basic properties are established, the Green's formulas and Somigliana-type integral representation of regular vector and classical solution of equations of steady vibrations are obtained, the uniqueness theorems for the internal and external boundary value problems (BVPs) of steady vibrations are proved, the basic properties of surface and volume potentials are established, and finally, the existence of classical solutions of the BVPs by means of the boundary integral method and the theory of singular integral equations are proved.

References

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