On investigation of three-dimensional initial-boundary value problem for thermoelastic piezoelectric bodies

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In the present paper three-dimensional linear dynamical model of thermoelastic piezoelectric bodies is considered with regard to magnetic field [1, 2]. Initial-boundary value problem with mixed boundary conditions corresponding to dynamical three-dimensional model of elastic body consisting of general inhomogeneous anisotropic material is investigated, when on certain parts of the boundary displacement vector, electric and magnetic potentials, and temperature is given, and on the remaining parts of the boundary density of surface force, and components of electric displacement, magnetic induction and heat flux vectors along the outward normal vector of the boundary are given. On the basis of differential formulation of the three-dimensional problem the corresponding variational formulation is obtained in spaces of vector-valued distributions with values in suitable Sobolev spaces. On the basis of the variational formulation by applying Faedo-Galerkin method, suitable a-priori estimates and compactness arguments the existence, uniqueness and continuous dependence of the solution on given data is proved.

References

[1] J.Y. Li, Magnetoelectroelastic multi-inclusion and inhomogeneity problems and their applications in composite materials, Int. J. Eng. Sci., 38 (2000), 1993-2011.

[2] D. Natroshvili, Mathematical problems of thermo-electro-magneto-elasticity, Lecture Notes of TICMI, 12 (2011).