MATHEMATICAL PROBLEMS OF THE THEORY OF ELASTICITY OF CHIRAL MATERIALS [1]

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Abstract

The purpose of this paper is to construct explicitly fundamental matrices of solutions to the differential equations of the theory of hemitropic elastic (chiral) materials. We consider the differential equations corresponding to the cases of pseudo-oscillations and steady state oscillations and in terms of elementary functions we construct fundamental matrices satisfying the generalized Sommerfeld-Kupradze type radiation conditions. On the basis of Green's formulae we derive the general integral representations of solutions in bounded and unbounded domains by means of potential type integrals. Properties of the single- and double-layer potentials and of certain, generated by them, boundary integral (pseudodifferential) operators are studied. Applying the potential method and the theory of pseudodifferential equations we prove the uniqueness and existence theorems of solutions to the Dirichlet, Neumann and mixed boundary value problems for the pseudo-oscillation equations. Some particular results are obtained for the steady state oscillation equations.

Key words and phrases: Elasticity theory, Elastic chiral materials, Fundamental matrix, Potential theory, Pseudodifferential equations, Boundary value problems.

AMS subject classification: 74H20, 35J55

[1] Dedicated to the memory of Professor Victor Kupradze on the occasion of the 100^{th} anniversary of his birth