Regularity of solutions to mixed interface crack problems

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We investigate regularity properties of solutions to mixed boundary value problems for the system of partial differential equations associated with the theory of thermo-piezoelectricity (thermo-electro-elasticity) of piecewise homogeneous anisotropic elastic solid structures with interior and interface cracks. Using the potential method and theory of pseudodifferential equations we prove the existence and uniqueness of solutions. The singularities and asymptotic behaviour of the thermo-mechanical and electric fields are analyzed near the crack edges and near the curves, where different types of boundary conditions collide. In particular, for some important classes of anisotropic media we derive explicit expressions for the corresponding stress singularity exponents and demonstrate their dependence on the material parameters. The questions related to the so called oscillating singularities are analyzed in detail as well.

The contribution extends the results obtained in the reference   [1] to more complex problems.

[1] **T. Buchukuri, O. Chkadua, D.Natroshvili**, *Mixed boundary value problems of thermopiezo-electricity for solids with interior cracks,* Integral Equations and Operator Theory, 64(4): 495-537, 2009.