

WEAK SOLVABILITY OF A PIEZOELECTRIC CONTACT PROBLEM

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In this lecture we consider a model of frictional contact between an electro-viscoelastic body and a conductive foundation, within the framework of the Mathematical Theory of Contact Mechanics. Unlike the models considered in the literature, we assume that the foundation is electrically conductive and the frictional contact conditions depend on the difference between the potential on the foundation and the body's surface. This assumption implies a fully coupling between the mechanical and the electrical unknowns on the boundary conditions and leads to a new and nonstandard mathematical model. We derive a variational formulation of the problem which is in a form of a system coupling an evolutionary variational inequality for the displacement field with a time-dependent variational equation for the electric potential field. Then, under a smallness assumption, we prove an existence and uniqueness result. The proof is based on arguments on evolutionary variational inequalities and fixed point. We also introduce a fully discretized scheme for the problem and present numerical simulations in the study of a two-dimensional test problem.