

# ANALYSIS AND NUMERICAL APPROACH OF A PIEZOELECTRIC CONTACT PROBLEM\*

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## Abstract

We consider a mathematical model which describes the frictional contact between an electro-viscoelastic body and a conductive foundation. The contact is modelled with normal compliance and a version of Coulomb's law of dry friction, in which the stiffness and friction coefficients depend on the electric potential. We derive a variational formulation of the problem and, under a smallness assumption, we prove an existence and uniqueness result. The proof is based on arguments on evolutionary variational inequalities and fixed point. Then, we introduce the fully discretized problem and present numerical simulations in the study of a two-dimensional test problem which describe the process of contact in a microelectromechanical switch.

**keywords:** electro-viscoelastic material, normal compliance, Coulomb's law, variational inequality, weak solution, finite element method, numerical simulations.

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\* Accepted for publication on 25.03.2009

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