



# A Frictional Contact Problem with Wear for Two Electro-Viscoelastic Bodies

A. Djabi

*Laboratory of Applied Mathematics, Department of Basic Education, Faculty of Economic Commerce and Management Sciences, University of Ferhat Abbas-Setif 1, Setif 19000, Algeria*

Received: January 6, 2023; Revised: March 13, 2023

**Abstract:** We consider a mathematical problem for the quasistatic contact between two electro-viscoelastic bodies. The contact is modelled with a version of normal compliance and the evolution of the wear function is described by Archard's law. We derive a variational formulation for the model and prove an existence and uniqueness result of the weak solution. The proof is based on the arguments of evolutionary variational inequalities, a classical existence and uniqueness result for parabolic inequalities and the Banach fixed point theorem.

**Keywords:** *electro-viscoelastic; fixed point; friction contact; piezoelectric; wear.*

**Mathematics Subject Classification (2010):** 74H20, 74H25, 49J40, 74M15.

## 1 Introduction

A considerable progress has been achieved recently in applied mathematics and mechanics for dynamic and quasistatic problems, the recent advances in the formulation of these problems are articulated around two main components, one devoted to the laws of behavior and the other devoted to the boundary conditions imposed on the body. The boundary conditions reflect the binding of the body with the outside world. The laws of behavior are stipulated by the nature of the materials under study, The authors utilize composite laws of behavior that combine materials with varying thermal and mechanical characteristics. These materials are referred to as thermo-mechanical materials. Alternatively, the authors also consider materials with combined mechanical and electrical behavior, which are known as piezoelectric materials. For the boundary conditions, the authors investigate the real processes such as adhesion, friction and wear to describe new

---

\* Corresponding author: <mailto:djabi.zaki@yahoo.fr>