



# A Dynamic Problem with Wear Involving Thermoviscoelastic Materials with a Long Memory

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**Abstract:** We consider a dynamic contact problem with friction in thermo-viscoelasticity with long memory body. The body is in contact with an obstacle. The contact is frictional and bilateral with a moving rigid foundation which results in the wear of the contacting surface. The problem is formulated as a coupled system of an elliptic variational inequality for the displacement and the heat equation for the temperature. We establish a variational formulation for the model and we prove the existence of a unique weak solution to the problem. The proof is based on a classical existence and uniqueness result for parabolic inequalities, differential equations and fixed point arguments.

**Keywords:** *frictional contact; thermo-visco-elastic; fixed point; dynamic process; variational inequality; wear.*

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## 1 Introduction

Scientific research and recent papers in mechanics are articulated around two main components, one devoted to the laws of behavior and the other devoted to boundary conditions imposed on the body. The boundary conditions reflect the binding of the body with the outside world. Recent researches use coupled laws of behavior between mechanical and electric effects or between mechanical and thermal effects. For the case of coupled laws of behavior between mechanical and electric effects, general models can be found in [5,6]. For the case of coupled laws of behavior between mechanical and thermal effects, the transmission problem in thermo-viscoplasticity is studied in [3], the contact problem

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