



# Contact Problem for Thermo-Elasto-Viscoplastic Material with Friction

N. Bensebaa\* and N. Lebri

*Department of Mathematics, Faculty of Sciences, University of Setif 1, 19000, Algeria*

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**Abstract:** We consider a quasistatic contact problem for thermo-elasto-viscoplastic material with thermal effects. The contact is modeled with the normal damped response condition, associated to Coulomb's law of dry friction. A variational formulation of the model is derived, and the existence of a unique weak solution is proved. The proofs are based on the arguments of evolutionary quasivariational inequality, the classical result of nonlinear first order evolution inequalities, and the fixed point arguments. We also study the dependence of the solution and prove a convergence result.

**Keywords:** *thermo-elasto-viscoplastic material; friction contact; normal damped response condition; Coulomb's friction; evolution equation; weak solution; fixed point.*

**Mathematics Subject Classification (2010):** 74F05, 74H25, 74M10, 74M25, 70K70, 70K75.

## 1 Introduction

Scientific research and recent papers in mechanics are articulated around two main components, one devoted to the laws of behavior and other devoted to the boundary conditions imposed on the body. The boundary conditions reflect the binding of the body with the outside world. The frictional contact between deformable bodies can be frequently found in industry and everyday life. Because of the importance in metal forming and automotive industry, a considerable effort has been made towards the modeling and numerical simulations of contact problems and the engineering literature concerning this topic is rather extensive. An excellent reference in the field of contact problems with or without friction is [8]. The constitutive law with internal variables has been used in various publications in order to model the effect of internal variables on the behavior

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\* Corresponding author: <mailto:nadjet.bensebaa@univ-setif.dz>