OPTIMAL CONTROL OF A FRICITIONLESS CONTACT PROBLEM WITH UNILATERAL CONSTRAINT

TOUZALINE AREZKI

Abstract. We consider a mathematical model which describes a contact between a nonlinear elastic body and a foundation. The contact is frictionless and modelled with normal compliance associated to unilateral constraint. The goal of this paper is to study an optimal control problem which consists of leading the stress tensor as close as possible to a given target, by acting with a control on the boundary of the body. We derive a variational formulation of the mechanical problem and prove its unique weak solvability. Then, we introduce a penalized contact problem which we prove existence, uniqueness and convergence results. We state an optimal control problem for which we prove the existence of solution. Finally, we consider an optimal control problem associated to the penalized contact problem and prove a convergence result.

REFERENCES


2010 Mathematics Subject Classification. 49J40, 47J20, 74M15.
Key words and phrases. optimal control, variational inequality, nonlinear elastic, unilateral constraint.


Received 3 February 2020

LABORATORY OF DYNAMICAL SYSTEMS, FACULTY OF MATHEMATICS, USTHB, BP 32 EL ALIA, BABB-EZZOUBAR 16111, ALGIERS, ALGERIA

Email address: ttouzaline@yahoo.fr