27th IFIP TC7 Conference 2015 on System Modelling and Optimization

Modelling and Control in Contact Mechanics

Analysis of a Viscoplastic Contact Problem with Normal Compliance, Unilateral Constraint and History-dependent Stiffness Coefficient

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Abstract: We consider a mathematical model which describes the frictionless contact between a viscoplastic body and foundation. The process is quasistatic and contact is modeled with normal compliance and unilateral constraint. Moreover, the stiffness coefficient is assumed to depend on the history of the contact process. We derive a variational formulation of the problem, which is in the form of a strongly nonlinear system coupling an integral equation with a history-dependent variational inequality. Then, we provide the analysis of the problem, which includes its unique weak solvability and the continuous dependence of the solution on the problem data.