

On a Variational Inequality Containing a Memory Term with an Application in Electro-Chemical Machining

Jörg Steinbach

Chair of Applied Mathematics, University of Technology, Center for Mathematical Sciences, Arcisstr. 21, 80290 Munich, Germany, steinbac@appl-math.tu-muenchen.de



Abstract: An obstacle problem with a memory term is studied in the framework of the variational inequality theory. Applying a fixed point argument and a convergence result for convex sets the existence and uniqueness of a solution are proved. Regularity results with respect to time and space are then deduced by using a penalization method. Furthermore, the time evolution of the solution is discussed. The particular evolutionary variational inequalities result from the application of a generalized Baiocchi-type transformation to degenerate free boundary problems with space- and, in particular, time-dependent coefficients. One of the applications is given by a quasi-stationary model for the electro-chemical machining problem.

Keywords: Evolutionary variational inequality, existence, uniqueness, regularity and time evolution of the solution, convex sets, penalization method, electro-chemical machining process

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