Thomas Surowiec

A bundle-free implicit programming approach for the optimal control of variational inequalities

The numerical solution of optimal control problems whose feasible sets are governed by variational inequalities presents a wide array of challenges. In addition to the difficulties arising from the modeling of the problem in function space, the lack of convexity of the feasible set and the presence of nonsmoothness cause traditional constraint qualifications fail. This complicates the development of efficient numerical algorithms significantly and, in particular, due the absence of convexity, causes one to develop an algorithmic and theoretical framework based on necessary first-order optimality conditions. Inspired by the literature on finite dimensional problems of this type, we use certain results from nonsmooth analysis in conjunction with more classical regularization techniques to develop a convergent algorithm in function space. The results are illustrated by a few numerical examples.