Optimal control of static elastoplasticity with hardening

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An optimal control problem governed by an elliptic variational inequality (VI) of first kind in mixed form is considered. This VI models the static problem of infinitesimal elastoplasticity with linear kinematic hardening. It is well known that the control-to-state map associated to VIs is in general not Gateaux-differentiable. Thus standard techniques to derive optimality conditions for optimal control problems cannot be employed. It can however be shown that the control-to-state operator associated to elastoplasticity is Bouligand differentiable. Based on this result, we establish second-order sufficient optimality conditions by means of a Taylor expansion of a particularly chosen Lagrange function.