SEMISMOOTHNESS FOR SOLUTION OPERATORS OF OBSTACLE-TYPE VARIATIONAL INEQUALITIES WITH APPLICATIONS IN OPTIMAL CONTROL

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ABSTRACT

This talk is concerned with generalized differentiability properties of solution operators of elliptic obstacle-type variational inequalities. We prove that such operators are semismooth when considered as maps between suitable Lebesgue spaces and equipped with the strong-weak Bouligand differential as a generalized set-valued derivative. It is shown that this semismoothness allows to solve optimal control problems with H^1-cost terms and one-sided pointwise control constraints by means of a semismooth Newton method. The q-superlinear convergence of the resulting algorithm is established in the infinite-dimensional setting and its mesh independence is demonstrated in numerical experiments. The talk concludes with comments on further applications of the derived results in the context of quasi-variational inequalities and the optimal control of contact problems.

References

[1] C. Christof, G. Wachsmuth. *Semismoothness for Solution Operators of Obstacle-Type Variational Inequalities with Applications in Optimal Control*, preprint, arXiv:2112.12018 (2021)

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