Semi - smooth Newton methods and applications

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Abstract

Semi-smooth Newton methods in function space setting will be developped and applications to non-smooth optimization and optimal control problems will be discussed. In certain situations, including optimal control with control control constraints, the original problem is often semi-smooth (for elliptic, parabolic and certain hyperbolic equations), and hence semi-smooth Newton methods are superlinearly convergent.

In other cases, proper regularization is required to guarantee superlinearly convergent numerical methods. These include optimal control problems with state constraints, optimal control of variational inequalities and portfolio optimization problems. Here we discuss Moreau-Yosida based regulariation techniques. A path-following strategy is proposed which allows an automatic tuning of the regularization parameter.