Generalized derivatives for the solution operator of the obstacle problem and error estimates for numerical approximations

Wednesday, August 14, 2024 11:00 AM (30 minutes)

We derive and present error estimates for numerical approximations of a particular Clarke subgradient for reduced objective functions arising in the optimal control of the obstacle problem. The corresponding generalized derivative of the solution operator of the obstacle problem is a solution operator of a Dirichlet problem on the complement of the strictly active set. Using finite element solutions of the obstacle problem, we construct discrete and convergent approximations of this set. To show that our approximations are suitable and convergent, a detailed study of the topological structure of the strictly active set under appropriate assumptions is necessary. Based on the smaller approximation, we solve the Dirichlet problem and obtain an upper bound for the error using the larger approximation. This upper bound converges to zero. We present numerical examples to test our estimates.

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Session Classification: MS 06: Recent advances in PDE-constrained optimization

Track Classification: Minisymposia: MS 06: Recent advances in PDE-constrained optimization