

Numerical Analysis and PDE

Mixed and Stabilized Finite Element Methods for the Obstacle Problem

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For the obstacle problem we consider two classes of finite element methods, a mixed and a stabilized formulation.

In the mixed formulation the contact force is an independent variable and we have a classical saddle point formulation covered by the Babuska-Brezzi theory. We prove the necessary inf-sup condition for a family of finite element spaces. Using this result, an a priori error estimate is derived. In addition, we derive an a posteriori estimate.

The other class is based on a stabilized formulation. The advantage of this is that an arbitrary choice of finite element spaces can be used. We prove this rigorously by stability and a priori estimates. We also prove an a posteriori estimate.

For both methods the estimates are confirmed by numerical computations.

This is joint work with Tom Gustafsson, Aalto University, and Juha Videman, Universidade de Lisboa.