

# Stabilized mixed finite element methods for the Stokes and obstacle problems

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## Abstract

Stabilization of mixed finite element methods for saddle point problems is a well-established technique that allows one to use finite element spaces that do not satisfy the Babuška–Brezzi condition. They were introduced in 80’s by Brezzi, Pitkäranta, Hughes, Franca and others. The analysis of these methods has however suffered from the fact that full regularity of the exact solution needs to be assumed.

In this talk, we discretize the Lagrange multiplier formulation of the Stokes and obstacle problems by a stabilized finite element method. Based on a technique introduced, for linear problems, by Gudi [1] we show how to derive quasi-optimal a priori estimates and a posteriori estimates by adding properly weighted residuals of the balance of momentum equations to the variational bilinear form. We consider both the Stokes [3] and membrane [2] obstacle problem and show numerical results.

**Keywords:** Stabilized FEM, obstacle problem, a posteriori estimates

## References

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