HP-ADAPTIVE INTERIOR PENALTY FEM FOR ELLIPTIC OBSTACLE PROBLEMS DG FOR LAPLACE, C^0 FOR BI-LAPLACE

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Abstract. Firstly, from [1] we consider a mixed formulation for an elliptic obstacle problem for a 2^{nd} order operator and present an hp-FE interior penalty discontinous Galerkin (IPDG) method. The primal variable is approximated by a linear combination of Gauss-Lobatto-Lagrange(GLL)-basis functions, whereas the discrete Lagrangian multiplier is a linear combination of biorthogonal basis functions. A residual based a posteriori error estimate is derived. For its construction the approximation error is split into a discretization error of a linear variational equality problem and additional consistency and obstacle condition terms.

Secondly, an hp-adaptive C^0-interior penalty method for the bi-Laplace obstacle problem is presented from [2]. Again we take a mixed formulation using GLL-basis functions for the primal variable and biorthogonal basis functions for the Lagrangian multiplier and present also a residual a posteriori error estimate. For both cases (2^{nd} and 4^{th} order obstacle problems) our numerical experiments clearly demonstrate the superior convergence of the hp-adaptive schemes compared with uniform and h-adaptive schemes.

References

[1] L. Banz, E. P. Stephan, *A posteriori error estimates of hp-adaptive IPDG-FEM for elliptic obstacle problems*, Applied Numerical Mathematics, 76 (2014), pp. 76–92.

[2] L. Banz, B. P. Lamichhane, E. P. Stephan, *An hp-adaptive C^0-interior penalty method for the obstacle problem of clamped Kirchhoff plates*, preprint (2015)

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