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Polynomial-degree-robust a posteriori estimates in a unified setting*

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Abstract

We present equilibrated flux a posteriori error estimates in a unified setting for conforming, nonconforming, discontinuous Galerkin, and mixed finite element discretizations of the two-dimensional Poisson problem. Relying on the equilibration by mixed finite element solution of patchwise Neumann problems, the estimates are guaranteed, locally computable, locally efficient, and robust with respect to polynomial degree. Maximal local overestimation is guaranteed as well. Numerical experiments suggest asymptotic exactness for the incomplete interior penalty discontinuous Galerkin scheme. Details can be found in [1].

Key words: a posteriori error estimate, equilibrated flux, unified framework, robustness, polynomial degree, conforming finite element method, nonconforming finite element method, discontinuous Galerkin method, mixed finite element method

Mathematics subject classifications (1991): 35J20, 65N15, 65N30, 76M10, 76S05

References

[1] Ern, A. and Vohralík, M, *Polynomial-degree-robust a posteriori estimates in a unified setting for conforming, nonconforming, discontinuous Galerkin, and mixed discretizations*. HAL Preprint 00921583, submitted for publication, (2014).

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