

The two-level local projection stabilization as an enriched one-level approach

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ABSTRACT

The two-level local projection stabilization is considered as a one-level approach in which the enrichments on each element are piecewise polynomial functions. The dimension of the enrichment space can be significantly reduced without losing the convergence order. On triangular meshes, for example, using continuous piecewise polynomials of degree $r \geq 1$, only $2r - 1$ functions per macro-cell are needed for the enrichment compared to r^2 in the two-level approach. In case of the Stokes problem $r - 1$ functions per macro-cell are already sufficient to guarantee stability and to preserve convergence order. On quadrilateral meshes the corresponding reduction rates are even higher. We give examples of “reduced” two-level approaches and study numerically the constant in the local inf-sup condition for the one-level and different two-level approaches, respectively.

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