

Polynomial-degree-robust a posteriori estimates for the virtual element method

The virtual element method (VEM) is becoming increasingly popular to discretize PDEs due to its ability to operate on general polytopal meshes and its structure-preserving properties. To reliably assess the error associated with the VEM approximation and efficiently adapt the mesh, a posteriori error estimators have been proposed in the literature. The estimators developed therein are residual-based and have two shortcomings: the constants in the inequalities linking the estimator to the error depend on (i) the polynomial degree of the discretization and (ii) the choice of stabilization. In contrast, for standard finite element (FEM) and discontinuous Galerkin (DG) discretizations, equilibrated estimators have been proposed to alleviate these limitations. Although the framework proposed in the literature for FEM and DG is fairly general, it cannot be immediately applied to the VEM, due to the nature of the stabilization and the fact that the shape functions are virtual. In this talk, I will present a posteriori error estimates that are robust with respect to the polynomial degree and the choice of stabilization. Beyond its intrinsic interest, the development of the estimators introduces new tools that may be helpful for other aspects of the numerical analysis of the VEM.

This is a joint work with J. Gedicke and L. Mascotto.