HYBRID STAGGERED DISCONTINUOUS GALERKIN METHOD ON GENERAL MESHES

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Abstract. In this talk, we present high-order hybrid staggered discontinuous Galerkin method on general meshes to solve general second order elliptic problems. Our formulation is related to standard staggered discontinuous Galerkin method, but more flexible and cost effective: rough grids are allowed and the size of the final system is remarkably reduced thanks to the partial hybridization. Optimal convergence estimates for both the scalar and vector variables are developed. Moreover, superconvergent results with respect to discrete H^1 norm and L^2 norm for the scalar variable are proved and negative norm error estimates for both the scalar and vector variables are also developed. On the other hand, mesh adaptation is particularly simple since hanging nodes are allowed, which makes the proposed method well suited for adaptive mesh refinement. Therefore, we design a residual type a posteriori error estimator, and the reliability and local efficiency of the error estimator are proved. Numerical experiments confirm the theoretical findings.

Keywords: Staggered DG, General polygonal mesh, Locking-free, Fixed stress splitting, Weak symmetry, Biot system, Poroelasticity

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