

A POSTERIORI ERROR ANALYSIS OF HDG METHODS IN FLUID MECHANICS

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ABSTRACT. We introduce and analyze *a posteriori* error estimators, of the residual type, for a hybridizable discontinuous Galerkin (HDG) method applied to two problems arising from fluid mechanics. The first one is a gradient-velocity-pressure formulation of the Brinkman problem, where, in order to derive our estimator, we use the Oswald interpolant and a suitable constructed postprocessed approximation of the velocity. The second problem is a gradient-velocity-pressure formulation of Oseen equations. In this case, in addition to the properties of the Oswald interpolant, we employ a weighted function technique to control the L^2 -error of the velocity. For both cases we establish reliability and local efficiency of the estimator for the L^2 -error of the velocity gradient and the pressure and the H^1 -error of the velocity, with constants written explicitly in terms of the physical parameters. Numerical experiments validate the quality of the adaptive scheme.

Keywords: Brinkman equations, Oseen equations, hybridizable discontinuous Galerkin method, *a posteriori* error analysis

Mathematics Subject Classifications (2010): 65N30

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