

ON A MULTISCALE A POSTERIORI ERROR ESTIMATOR FOR THE STOKES AND BRINKMAN EQUATIONS

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ABSTRACT. This work proposes and analyzes a residual a posteriori error estimator for the Multiscale Hybrid-Mixed (MHM) method for the Stokes and Brinkman equations. The error estimator relies on the multi-level structure of the MHM method and considers, in this work, two levels of approximation of the method. As a result, the error estimator accounts for a first-level global estimator defined on the skeleton of the partition and second-level contributions from element-wise approximations. The analysis establishes local efficiency and reliability of the complete multiscale estimator. Also, it yields a new face-adaptive strategy on the mesh's skeleton which avoids changing topology of the global mesh. Specially designed to work on multiscale problems, the present estimator can leverage parallel computers since local error estimators are independent to one another. Academic and realistic multiscale numerical tests assess the performance of the estimator and validate the adaptive algorithms.

keywords: a posteriori error estimator; Stokes operator; multiscale finite element; high-order approximation.

Mathematics Subject Classifications (2010): 65L60.

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