

A mixed finite element method for a vorticity-velocity-pressure formulation of the Brinkman problem

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ABSTRACT

Numerical approximation of the stationary two-dimensional Stokes equations, formulated in terms of vorticity, velocity and pressure. By employing an extension of the Babuska-Brezzi theory, it is proved that the resulting continuous and discrete variational formulations are well-posed. In particular, we show that Raviart-Thomas elements of order $k \geq 0$ for the approximation of the velocity field, piecewise continuous polynomials of degree $k+1$ for the vorticity, and piecewise polynomials of degree k for the pressure, yield unique solvability of the discrete problem. We establish a priori error estimates in the natural norms. Finally, we report several numerical experiments illustrating the behavior of the proposed scheme and confirming our theoretical results.

We will report on results obtained in collaboration with V. Anaya, R. Oyarzúa and R. Ruiz-Baier.

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