Adaptive mixed isogeometric analysis of a highly convective benchmark problem for the Boussinesq equations

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ABSTRACT

In this article, we study a special benchmark problem for the Boussinesq equations. This is the Navier-Stokes equations coupled with the Advection-Diffusion equation, and it is used for modelling buoyancy-driven flow. The solution process is mixed isogeometric discretization combined with adaptive mesh refinement [4]. We discretize the equation system with the recently proposed isogeometric versions of the Taylor-Hood, Sub-Grid and Raviart-Thomas elements [1]. The adaptive refinement is based on LR B-splines [2] and recovery estimators [3]. We investigate the suitability of our adaptive methods for Rayleigh numbers in the range 10^1-10^5, by comparing with high-resolution reference solution.

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