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Locally stabilized P_1 -nonconforming quadrilateral and hexahedral finite element methods for the Stokes equations

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Review text:

This paper is concerned with a locally stabilized nonconforming finite element method for the stationary incompressible Stokes problems. The authors consider a locally stabilized finite element method and adopt the P_1 -nonconforming quadrilateral and hexahedral elements for the approximation of both velocity and pressure variables. They investigated numerically stabilized method based on an existing lowest equal-order nonconforming pair and the standard finite element method based on the same pair for the two and three dimensional Stokes equations. The article is a complement of some previous works in a sense that it demonstrates the high efficiency of the locally pressure-projection stabilized methods and illustrates the flexibility of the definition of pressure-projection operator. Optimal error estimates are derived in the energy norm and L^2 -norm for the velocity and L^2 -norm for the pressure.

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