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Stabilized virtual element method for the incompressible Navier-Stokes equations

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SUMMARY

In this work, we present a stabilized virtual element method (VEM) discretization for the incompressible Navier-Stokes equations. Basically, VEM can be considered a generalization of FEM that enables a polynomial decomposition of the domain. VEM has been applied to elasticity and fluidmechanics differential equations [1, 2, 3]. In this work, the concepts of stabilized methods [4] are introduced in the VEM formulation. Thus, stabilization terms are included in the variational form to circumvent the Babuška-Brezzi condition and to stabilize the solution for convection dominated flows. Numerical examples are presented to show the behavior of the method.

Keywords: VEM, Navier-Stokes equations, Stabilized methods

AMS Classification: 76D05, 65M60

References

[1] Beirão da Veiga, L., Brezzi, F., Cangiani, A., Manzini, G., Marini, L., Russo, A.. Basic principles of virtual element methods. *Math. Mod. Meth. Appl. S.* **23**(01), 199–214, 2013.

[2] Beirão da Veiga, L., Lovadina, C., Vacca, G.. Virtual elements for the Navier-Stokes problem on polygonal meshes. *arXiv preprint arXiv:1703.00437*, 2017.

[3] Brezzi, F., Marini, L.. Virtual element methods for plate bending problems. *Comput. Methods in Appl. Mech. Eng.* **253**, 455–462, 2013.

[4] Franca, L., Frey, S., Hughes, T.. Stabilized finite element methods: II. The incompressible Navier-Stokes equations. *Comput. Methods in Appl. Mech. Eng.* **99**, 209–233, 1992.

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