Suitable boundary constraints for divergence-conforming discretisation for Stokes-problem

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ABSTRACT

To solve the incompressible flow problems using isogeometric analysis, the div-compatible spline spaces were originally introduced by Buffa, de Falco and Sagnalli [1], and later further developed by Evans [2]. Johannessen, Kumar and Kvamsdal [3] extended these developments to adaptively meshes using LR B-splines as introduced by Johannessen, Kvamsdal and Dokken [4].

These divergence conforming spaces have the drawback that under certain boundary conditions they result in spurious pressure modes. Specifically for 2D flow with no-slip boundary conditions on the entire domain, we see 5 spurious modes, one for the average pressure and one for each of the 4 corners of our parametric domain. In this talk we will show a technique to suppress these modes, even when enforcing the no-slip conditions strongly. The method generalizes to volumetric simulations as well as meshes with local refinement.

We will demonstrate the suitability of the proposed boundary constraints for 2D tensor surface, 3D tensor volume and 2D LR splines cases with analytical solution.

REFERENCES

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