

A Posteriori Error Estimates for Isogeometric Analysis of the Navier-Stokes equation

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ABSTRACT

In this article, we will develop and present suitable error estimators for adaptive mixed isogeometric methods for solving the Navier-Stokes equation. We will compare the use of residual-based error estimators with superconvergent patch recovery methods [1]. The adaptive refinement will be based on the use of LR B-splines [2], and the recently proposed methods using isogeometric Taylor-Hood and div-conforming elements [3]. The different estimators will be thoroughly tested on problems with (manufactured) analytical solutions.

REFERENCES

- [1] Kumar, M., Kvamsdal, T. and Johannessen, K. A. Superconvergent patch recovery and a posteriori error estimation technique in adaptive isogeometric analysis. *Computer Methods in Applied Mechanics and Engineering*, 316, pp. 1086-1156, 2017.
- [2] K. A. Johannessen, T. Kvamsdal, and T. Dokken. Isogeometric analysis using LR B-splines. *Computer Methods in Applied Mechanics and Engineering*, 269:471–514, 2014.
- [3] K. A. Johannessen, M. Kumar and T. Kvamsdal. Divergence-conforming discretization for Stokes problem on locally refined meshes using LR B-splines, *Computer Methods in Applied Mechanics and Engineering*, 293: 38–70, 2015.