

# **A Posteriori Error Estimates for Isogeometric Analysis of Stokes problem**

**Abdullah Abdullahe<sup>1</sup>, Trond Kvamsdal<sup>1</sup>, Mukesh Kumar<sup>2</sup> and Arne Morten Kvarving<sup>3</sup>**

<sup>1</sup> Department of Mathematical Sciences  
Norwegian University of Science and Technology, Trondheim, Norway  
e-mail: [abdullah.abdulhaque@ntnu.no](mailto:abdullah.abdulhaque@ntnu.no), [trond.kvamsdal@ntnu.no](mailto:trond.kvamsdal@ntnu.no)

<sup>2</sup> Department of Mathematics  
College of Charleston, South Carolina, USA  
e-mail: [kumarm@cofc.edu](mailto:kumarm@cofc.edu)

<sup>3</sup> Department of Applied Mathematics and Cybernetics  
SINTEF ICT, Norway  
e-mail: [arne.morten.kvarving@sintef.no](mailto:arne.morten.kvarving@sintef.no)

## **ABSTRACT**

In this article, we will develop and present suitable error estimators for adaptive mixed isogeometric methods for solving 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 divergence-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.