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### **Adaptive isogeometric analysis based on superconvergent patch recovery**

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Reliability and efficiency are two major challenges in simulation based engineering. These two challenges may be addressed by error estimation combined with adaptive refinements. A lot of research has been performed on error estimation and adaptive mesh refinement. However, adaptive methods are not yet an industrial tool, partly because the need for a link to traditional CAD-system makes this difficult in industrial practice. Here, the use of an isogeometric analysis framework introduced by Professor Thomas J. R. Hughes (UT at Austin) and coworkers [1] may facilitate more widespread adoption of this technology in industry, as adaptive mesh refinement does not require any further communication with the CAD system. In this talk we address the problem of existence of superconvergence points of approximate solutions, obtained from the Isogeometric Finite Element Method (IFEM), of a model elliptic problem. Then we present a posteriori error estimator based on recovery of derivatives via Superconvergent Patch Recovery (SPR) method, and we show that our SPR method for the improvement of derivatives fulfills the criteria set out by Ainsworth and Craig in [2] for a "superconvergent gradient recovery operator". The adaptive refinement is achieved using local refinement strategies developed in Johannessen et al. [3] based on LR B-splines by Dokken et al. [4]. The developed a posteriori based adaptive refinement methodology will be tested on classical Poisson benchmark problems. The focus will be on optimal convergence rate as well as the effectivity of the proposed error estimator.

#### **References**

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