Goal Oriented Adaptive Isogeometric Methods using LR B-splines

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ABSTRACT

The new paradigm of Isogeometric analysis, which was introduced by Thomas J. R. Hughes et al. [1], demonstrates that much is to be gained with respect to efficiency, quality and accuracy in analysis by replacing traditional Finite Elements by volumetric B-splines or NURBS elements. However, B-splines and NURBS are not flexible as they lack the possibilities of local refinement. However, the LR B-splines proposed by [2] facilitate adaptive mesh refinement [3].

To do *Goal Oriented Adaptivity* (GOA) i.e., adapt the finite element mesh for an identified *Quantity of Interest (QI)* (e.g., stress at a point or stress resultants at a cross section) we need a reliable *a posteriori error estimator* to drive the adaptive refinement procedure. Kumar, Kvamsdal and Johannessen [4] developed Continuous Global L_2 (CGL2) and Superconvergent Patch Recovery (SPR) error estimation methods applicable for LR B-splines, whereas in [5] we constructed an error estimator based on a Serendipity pairing of approximation spaces. We achieved very good results for all approaches (i.e., effectivity indices closed to 1) when applied to classical benchmark problems.

We will herein present results obtained for GOA based on all the aforementioned approaches on a number of benchmark cases for elliptic problems.

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