Technische Universität Braunschweig

MUSEN

Adaptive isogeometric methods based on LR B-splines

Lecture of

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The new paradigm of Isogeometric analysis, which was introduced by Thomas J. R. Hughes and coworkers at University of Austin, 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, tensorial B-splines are not flexible enough to be a common basis for future CAD and FEA due to the lack of local refinement. Different methods have been developed to circumvent this e.g. T-splines, Hierarchical splines and LR B-splines.

We will herein present posteriori error estimates suitable for isogeometric finite element methods. Residual based error estimates have proven to be fairly good for identifying the error distribution, but does not give a reliable estimate of the error level, i.e. the effectivity index is far from being close to unity. Thus, to achieve more accurate estimation of the error we have developed a posteriori error estimator based on recovery of gradients (stresses). We have investigated both local and global projections methods that fulfills the criteria for a "superconvergent gradient recovery operator". We have developed adaptive refinement methodology using LR B-splines for multipatch 2D and 3D problems for Poisson, elasticity and Stokes flow.