Theoretical properties of C^1 multi-patch constructions

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ABSTRACT

In IGA, the high order of continuity of tensor-product B-splines allows the use of a standard Galerkin discretization to solve higher order partial differential equations directly. When dealing with complex geometries, such that cannot be represented by a single tensor-product patch, special constructions need to be employed to maintain the global smoothness properties. In this talk we focus on C^1 spaces over unstructured meshes, more precisely on spaces over multi-patch domains.

We assume to have given a C^0-conforming multi-patch geometry that is fixed at an initial level. Over such a domain, one can define C^0 isogeometric spaces and their C^1 subspaces. Performing h-refinement on such a configuration produces a sequence of nested isogeometric spaces. The properties of these spaces depend on the underlying initial geometry.

We study theoretical properties of the C^1 spaces, such as local polynomial and spline reproduction as well as approximation properties, mostly in the L^2- and energy norms. We discuss and compare with alternative approaches, which rely on some form of relaxation, by increasing the polynomial degree, reducing the smoothness requirements or discarding the nestedness of the spaces.

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