Construction of approximate C^1 bases on two-patch domains

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ABSTRACT

One key element of isogeometric analysis is that it allows high order smoothness within one patch. However, this is not the case on so-called multi-patch geometries where the global continuity is C^0. Therefore, for C^1-smooth isogeometric functions, a special construction for the basis is needed. Such spaces are of interest when solving numerically fourth-order PDE problems, such as the biharmonic equation, using an isogeometric Galerkin method.

With the construction of so-called analysis-suitable G^1 (in short, AS-G^1) parameterizations it is possible, under certain additional assumptions, to have C^1 isogeometric spaces with optimal approximation properties [1, 2]. These geometries satisfy certain constraints along the interfaces.

The problem is that most complex geometries are not AS-G^1 geometries. Therefore we define basis functions for isogeometric spaces by enforcing approximate C^1 conditions. For this reason the defined function spaces are not exactly C^1 but only approximately. We study the convergence behaviour and define function spaces that behave optimally under h-refinement, by locally introducing functions of higher polynomial degree and/or lower regularity. For the numerical tests we focus on the influence of a single, non-trivial interface within a two-patch domain.

REFERENCES

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