

# Analysis-suitable $G^1$ multi-patch domains in IGA

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## ABSTRACT

We study the properties of  $C^1$  smooth isogeometric function spaces over multi-patch domains. In this context, an isogeometric function is a function defined on a B-spline domain, whose graph surface also has a B-spline representation. Here, the domain of interest is composed of multiple B-spline patches. We develop the construction of a basis for the  $C^1$  smooth space, by splitting it into contributions on patches and along interfaces (see [2]) as well as at vertices.

We restrict ourselves to a special case of domains, so-called analysis-suitable  $G^1$  multi-patch domains, first introduced in [1]. For these domains, the underlying geometric continuity conditions have a special form. We will conclude that this class of geometries is exactly the one which allows  $C^1$  isogeometric spaces with optimal approximation properties. Such spaces are of vital interest when solving numerically fourth-order PDE problems, such as the biharmonic equation, using the isogeometric method. Moreover, we will discuss the flexibility of analysis-suitable  $G^1$  multi-patch domains.

## REFERENCES

- [1] Collin, A., Sangalli, G., Takacs, T.: *Analysis-suitable  $G^1$  multi-patch parametrizations for  $C^1$  isogeometric spaces*. Computer Aided Geometric Design, Vol. 47, 2016, pp. 93-113.
- [2] Kapl, M., Sangalli, G., Takacs, T.: *Dimension and basis construction for analysis-suitable  $G^1$  two-patch parameterizations*. Computer Aided Geometric Design, in press, 2017.