## Analysis-suitable $G^1$ multi-patch parametrizations for isogeometric analysis

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Multi-patch spline parametrizations are often used in geometric design to represent geometrically complex domains of interest. In isogeometric analysis (IGA), these representations are then used to perform numerical simulations of physical processes on such domains. IGA allows for discretizations of high continuity within single patches. This is necessary e.g. when employing a standard Galerkin discretization of the variational formulation of a fourth order partial differential equation, where  $C^1$  smoothness is needed. In this talk we discuss the imposition of  $C^1$  smoothness over planar multi-patch domains and its application to IGA.

We deal with a particular class of multi-patch spline parametrizations called analysis-suitable  $G^1$  (AS- $G^1$ ) multi-patch parametrizations, introduced in [1]. This class of parametrizations has to satisfy specific geometric continuity constraints, and is of importance since it allows to construct, on the multi-patch domain,  $C^1$  isogeometric spaces with optimal approximation properties. In this context, on every patch individually, the isogeometric functions are B-splines composed with the inverse of the patch parametrization.

Such AS- $G^1$  multi-patch parametrizations are suitable for modeling complex multi-patch domains. We present the theoretical foundations as well as basis constructions and demonstrate the dependence of the space on the multi-patch topology and on the patch parametrizations. Moreover, we discuss constructions of AS- $G^1$  multi-patch parametrizations for geometrically complex domains.

Joint work with: Annabelle Collin, Mario Kapl, Giancarlo Sangalli.

## References

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