Extended Mortar Method for weak C^n continuous multi-patch coupling.

C. Hesch*, B. Wohlmuth†, S. Schuß* and M. Dittmann*

* Chair of Computational Mechanics
University of Siegen
Paul-Bonatz-Str. 9-11, Siegen, Germany
e-mail: christian.hesch@uni-siegen.de, Web page: http://www.mb.uni-siegen.de/nm/

† Faculty of Mathematics
Technical University of Munich
Garching, Germany
e-mail: barbara.wohlmuth@ma.tum.de - Web page:
http://www-m2.ma.tum.de/bin/view/Allgemeines/ProfessorWohlmuth

ABSTRACT

Isogeometric methods applied in the context of higher-order partial differential equations have gained increasing attention. In the present contribution, we formulate a methodology to enforce interface conditions preserving higher-order continuity across the interface.

As a prototypical example for higher-order coupling conditions, we aim to analyse multi-patch Kirchhoff–Love shell elements, which require G^1 continuity at the interface, see [1]. Therefore, we have first to investigate general weak C^n Mortar coupling conditions, see [2] for detailed informations. Afterwards, we modify this formulation to enforce the geometrical continuity for Kirchhoff–Love shell elements in the sense that the tangent vectors at the interface have to be coplanar at the common edge.

Eventually, we demonstrate how to deal with crosspoints as they arise in multi-patch geometries, see [3]. This modification is constructed in such a way, that we decouple the Lagrange multipliers at the crosspoint to avoid a global coupling condition across all interfaces. Moreover, we recast the underlying B-Splines such that they preserve the higher-order best approximation property across the interface and the crosspoint.

REFERENCES

[1] S. Schuß, M. Dittmann, B. Wohlmuth, S. Klinkel and C. Hesch. Multi-patch isogeometric analysis for Kirchhoff-Love shell elements, *Comput. Methods Appl. Mech. Engrg.*, 349:91-116, 2019.

[2] M. Dittmann, S. Schuß, B. Wohlmuth and C. Hesch. Weak C^n coupling for multipatch siogeometric analysis in solid mechanics, *International Journal for Numerical Methods in Engineering*, DOI:10.1002/nme.6032, 2019.

[3] M. Dittmann, S. Schuß, B. Wohlmuth and C. Hesch. Crosspoint modification for multi-patch isogeometric analysis, *Comput. Methods Appl. Mech. Engrg.*, submitted.