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Talk announcement

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11:00, S2 416-1

Multigrid methods for the biharmonic equation on multi-patch domains

In this talk, we present an ongoing investigation into multigrid solvers for biharmonic equations discretized using isogeometric analysis (IGA). Our primary interest lies in handling C^1-smooth multi-patch domains, which are relevant for fourth-order partial differential equations (PDEs) arising in structural modeling of thin plates and shell structures, discretized with multi-patch spline parameterizations.

Motivated by the works [1] and [3], we explore analysis-suitable G^1 multi-patch parametrizations that facilitate C^1-smooth discretizations. Additionally, we outline a multigrid framework inspired by [4], focusing on efficient two-level refinement relations and the structure of smoothing matrices to optimize computational efficiency. We also discuss prospects for extending these techniques to arbitrary multi-patch surfaces, following the ideas in [2].

This research is part of the ongoing project 'Isogeometric multi-patch shells and multigrid solvers'.

[1] A. Collin, G. Sangalli, T. Takacs. Analysis-suitable G^1 multi-patch parametrizations for C^1 isogeometric spaces, *Computer Aided Geometric Design*, 47 (2016) 93–113.

[2] A. Farahat et al. Isogeometric analysis with C^1-smooth functions over multi-patch surfaces, *Computer Methods in Applied Mechanics and Engineering*, 403, Part A (2023) 115706.

[3] M. Kapl, G. Sangalli, T. Takacs. Dimension and basis construction for analysis-suitable G^1 two-patch parameterizations, *Computer Aided Geometric Design*, 52–53 (2017) 75–89.

[4] J. Sogn, S. Takacs. Robust multigrid solvers for the biharmonic problem in isogeometric analysis, *Computers & Mathematics with Applications*, 77, Issue 1 (2019) 105–124.