

Efficient Solvers for Discontinuous Galerkin Space Time Isogeometric Analysis Discretizations of Parabolic Problems

Christoph Hofer¹ Ulrich Langer²

In this talk, we construct and investigate fast solvers for large-scale linear systems of algebraic equations arising from the application of isogeometric analysis (IgA) to parabolic diffusion problems. We consider decompositions of the space time cylinder into time slabs, where each slab is again decomposed into several space-time patches. We use dG-techniques to provide information transfer between the time slabs, whereas the patches in a time slab are coupled in a conforming way. In the first part of the talk, we present the assembling techniques, which is based on the tensor product structure of the problem. The second part deals with the solution strategy, which is based on the time parallel multigrid method developed in [1]. We utilize the multipatch structure of the time slabs by using some iterations of the Isogeometric Tearing and Interconnecting method as smoother in each time slab. We conclude the talk the discussion of some numerical results.

References:

[1] M. J. Gander and M. Neumueller. Analysis of a New Space-Time Parallel Multigrid Algorithm for Parabolic Problems, *SIAM Journal on Scientific Computing* 2016 38:4, A2173-A2208

¹ Johannes Kepler University Linz, Doctoral Program *Computational Mathematics*, Austria,
christoph.hofer@ricam.oeaw.ac.at

² Johannes Kepler University Linz, Institute for Computational Mathematics, Austria,
ulanger@numa.uni-linz.ac.at