Time Discontinuous Galerkin multipatch Isogeometric Analysis of Parabolic Problems

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ABSTRACT

In this talk, we present a time discontinuous Galerkin multipatch Isogeometric Analysis (dGIGA) scheme for solving linear parabolic problems. For building up the proposed scheme, first we derive an appropriate space-time weak formulation, by multiplying the Partial Differential Equation problem (PDE) by a test function depending on space and time variable, and by applying integration by parts in both variables. Then, using the resulting formulation, we define the dGIGA method, where we discretize in space and in time in a unified way. In particular, we describe the space time cylinder, that is the whole computational domain, as a union of space-time patches. In every space-time patch, the problem is discretized in space and in time simultaneously, without imposing continuity requirements of the B-spline spaces across the interfaces of the patches. For stabilizing the time discretization, the method incorporates ideas of streamline diffusion methodology. The communication of the patch-wise discrete solutions is ensured by introducing simple "up-wind" jump terms across the interfaces. We prove stability of the discrete problem with respect to a suitable norm, and show a priori discretization error estimates in this norm. We present few numerical examples that support our theoretical estimates. This talk is based on the joint work [1]. This work was supported by the Austrian Science Fund (FWF) under the grant NFN S117-03 and W1214-N15, project DK4.

REFERENCES

[1] C. Hofer, U. Langer, and I. Toulopoulos *Multipatch Time Discontinuous Galerkin Space-Time Isogeometric Analysis of Parabolic Evolution Problems.* (2017) *under preparation.*