JOHANNES KEPLER UNIVERSITY LINZ

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Talk announcement

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Analysis and Applications of IETI-DP Solvers

In this talk, we consider a convergence analysis of Dual-Primal IsogEometric Tearing and Interconnecting (IETI-DP) methods for the generalized Poisson equation in two dimensions. The first part of the presentation is about an analysis for conforming Galerkin discretizations. We show convergence estimates of a Schur complement IETI-DP method that is explicit in problem parameters like the grid size, the patch diameters and the spline degree. This convergence bound carries over to a saddle point based IETI-DP method, which allows the incorporation of inexact local solvers, e.g., based on the fast diagonalization (FD) method. In the second part of the talk we present a convergence analysis of IETI-DP solvers for symmetric interior penalty discontinuous Galerkin discretizations. First we assume that there are no T-junctions in the computational domain. In this case, the convergence estimates for a Schur complement IETI-DP method are similar to those obtained in the case of conforming Galerkin discretizations. A condition number bound for an inexact IETIDP method based on FD preconditioners for the local subproblems is given, that is explicit in the grid size and the patch diameters. We validate the findings with numerical experiments applied to model problems. Moreover, we show and analyze a IETI-DP solver where T-junctions might be present in the computational domain. We apply this novel IETI-DP method to a problem motivated from a real world application, which is the simulation of a rotating electrical motor.