JOHANNES KEPLER UNIVERSITY LINZ

Johannes Kepler Universität Linz
Institut für Numerische Mathematik

Univ.-Prof. Dr. Herbert Egger

PhD defence

Rainer Schneckenleitner
(Institute of Computational Mathematics)

Thursday, Dec 9, 2021
15:00, via ZOOM

Analysis and Applications of IETI-DP Solvers

We present 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. We validate the theoretical 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 IETIDP method to a problem motivated from a real world application, which is the simulation of a rotating electrical motor.