Discontinuous Galerkin Isogeometric Analysis for some elliptic problems with Singularities

Stephen Moore[1]

Mutlipatch discontinuous Galerkin Isogeometric Analysis (dGIGA) consists of decomposing complex domains into several subdomains usually called patches. Many real-life engineering applications also involve complex domains with non-smooth boundary parts, changing boundary conditions, non-smooth coefficients arising from material interface, etc. It is well known that standard numerical schemes on uniform meshes do not yield optimal convergence rate due to the regularity of the solution in the vicinity where the singularities occur. We therefore develop and analyze a graded mesh for multipatch discontinuous Galerkin isogeometric analysis (dGIGA) which leads to the desired and expected optimal convergence rate. The dGIGA mesh grading uses a priori information of the behavior of the solution around the points, where the singularity occurs, and create an appropriate mesh sequence yielding the same convergence rate as in the smooth case. In this talk, we present a priori error estimates and numerical results for non-matching meshes along the patch interfaces.

References:

[1] https://doi.org/10.1016/j.camwa.2015.03.011

[1]University of Cape Coast, Mathematics
stephen.moore@ucc.edu.gh