

# Adaptive Discontinuous Galerkin Methods for Optimal Control Problems

**Hamdullah Yücel**

*Institute of Applied Mathematics, Scientific Computing, METU, Ankara*

[yuecel@mpi-magdeburg.mpg.de](mailto:yuecel@mpi-magdeburg.mpg.de)

Many real-life applications such as the shape optimization of technological devices, the identification of parameters in environmental processes and flow control problems lead to optimization problems governed by systems of convection diffusion partial differential equations (PDEs). When convection dominates diffusion, the solutions of these PDEs typically exhibit layers on small regions, where the solution has large gradients. Hence, it requires special numerical techniques, which take into account the structure of the convection. The integration of discretization and optimization is important for the overall efficiency of the solution process. Discontinuous Galerkin (DG) methods have become recently as an alternative to the finite difference, finite volume and continuous finite element methods for solving wave dominated problems like convection diffusion equations due the better convergence behavior, local mass conservation, flexibility in approximating rough solutions on complicated meshes and mesh adaptation.

This talk will mainly focus on analysis and application of DG methods for the optimal control problems with an adaptive refinement strategy. Several numerical examples will be presented to illustrate the performance of the proposed method.