High Order DG Type Methods
for Control and Optimization
of Convection-Diffusion Systems

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Abstract: In this presentation we discuss the application of a high order combined finite element-finite volume (FE-FV) method for optimization and control of convection-diffusion equations. This scheme is a special case of high order discontinuous Galerkin (DG) methods and can be shown to be convergent uniformly with respect to the diffusion coefficient. Also, one can show that the method can be constructed to ensure dual convergence for optimization. However, if one uses a low order finite volume scheme, then the convergence rates for optimization and control is limited by the order of the finite volume method. In this talk we provide some simple examples to illustrate these points and present an approach to the development of higher order schemes. Finally, we present numerical results for optimization of a counter flow heat exchanger.

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