

İSTANBUL ANALYSIS SEMINARS

OPTIMAL CONTROL OF BURGER'S AND DIFFUSION-CONVECTION EQUATIONS

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Abstract: Combining the Computational Fluid Dynamics (CFD) and advanced optimization methods for flow control and optimization became recently a new research trend in computational science. One of the main research fields is the PDE (partial differential equation) constrained optimal control. Using the so-called “optimize and discretize” strategy, the optimality conditions are developed in function spaces that are then discretized and solved.

We consider optimal control of Burger's equation and diffusion-convection equation. The optimality conditions are expressed by elliptic boundary value problem in the space-time domain. The equivalence of these optimality conditions to a forward-backward system of parabolic PDE's is shown. The optimality condition allows to apply specialized elliptic PDE solvers to the optimality system without much implementational effort. Numerical experiments for some example problems underline the applicability of this approach.

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