

Abstract Submitted  
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**Optimal transport of diffusive scalar from the boundary** PIYUSH GROVER, Mitsubishi Elec Res Lab, YUNFEI SONG, Mitsubishi Elec Res Lab and Lehigh Univ. — Motivated by the problem of microfluidic heat transfer, we consider the optimal control of advection-diffusion in Stokes flows in two dimensional bounded domains. Our aim is to identify the incompressible velocity fields which result in most efficient transport of a diffusive scalar from boundary. We discretize the PDE using a spectral formulation, and derive the optimality conditions for the resulting system of ODEs. We assume that the optimal velocity field can be constructed by a linear combination of the available finite set of basis velocity fields. We compare the results obtained under constraints of fixed energy and fixed enstrophy. We also compare the numerical results with some theoretical predictions and bounds, and discuss the role of chaotic mixing in this process.

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