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Optimal localized control of the onset of turbulence in a channel flow[1] RASHAD MOARREF, BINH K. LIEU, MIHAILO R. JOVANOVIC, University of Minnesota — For the problem of controlling the onset of turbulence in a channel flow, we study the design of optimal localized state-feedback controllers. The actuation is generated by blowing and suction at the walls and we assume that (i) the actuators are placed along a two-dimensional lattice of equally spaced points; and that (ii) each actuator uses information from only a limited number of nearby sensors. We utilize recently developed tools for designing structured optimal feedback gains to reduce receptivity of velocity fluctuations to flow disturbances in the presence of control. Our preliminary DNS result, conducted at low Reynolds numbers, show that this approach can indeed maintain the laminar flow. This is in contrast to the localized strategies obtained by spatial truncation of optimal centralized controllers, which may introduce instability and promote transition even in the situations when the uncontrolled flow stays laminar.

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