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Sensor selection for feedback control of transient energy growth in wall-bounded shear flows[1] HUAIJIN YAO, YIYANG SUN, MAZIAR S. HEMATI, University of Minnesota — Laminar-to-turbulent transition in wall-bounded shear flows can be suppressed by reducing transient energy growth (TEG) of small flow perturbations using feedback control. Previous studies on TEG reduction have made use of shear-stress measurements at the walls to design sensor-based output feedback control laws. Within the context of linear quadratic optimal control methods, output feedback strategies based on wall shear-stress sensors alone are unable to achieve comparable TEG performance to full-information controllers. Here, we show that TEG performance for linear quadratic output feedback control strategies can be improved by selecting an alternative set of sensors for feedback. Two systematic approaches for performing the requisite sensor selection task will be presented. All results are demonstrated within the context of a sub-critical channel flow, actuated using wall-normal blowing and suction from the upper and lower walls.

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