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Reynolds number effects on drag reduction of turbulent boundary layers subject to wall oscillation MANEESH MISHRA, MARTIN SKOTE, School of Mechanical and Aerospace Engineering, Nanyang Technological University, Singapore — Drag reduction (DR) of external flows were studied using direct numerical simulations of spatially growing turbulent boundary layers with temporal wall oscillations. Three simulations with similar oscillation parameters were performed at different streamwise positions to explore the effects of Reynolds number (Re) on DR. One of the simulation cases replicates an experiment and results are in excellent agreement for both mean quantities and turbulence statistics. Downstream development of skin friction, velocity profiles and turbulence statistics have been studied. Spatial transients for the peak values of turbulence statistics have been found to show a non-monotonic behaviour before reaching a stable steady value. To check the feasibility of DR at high Re, a predictive relation has been modelled based on current and previous experimental and simulation data. In light of these results, feasibility of this technique for real world applications is discussed.

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