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Linear Mechanisms and Pressure Fluctuations in Wall Turbulence KAMTHON SEPTHAM, JONATHAN MORRISON, Department of Aeronautics, Imperial College, London, SW7 2AZ, UK — Full-domain, linear feedback control of turbulent channel flow at $Re_\tau \leq 400$ via vU' at low wavenumbers is an effective method to attenuate turbulent channel flow such that it is relaminarised. The passivity-based control approach is adopted and explained by the conservative characteristics of the nonlinear terms contributing to the Reynolds-Orr equation (Sharma *et al*. *Phys. Fluids* 2011). The linear forcing acts on the wall-normal velocity field and thus the pressure field via the linear (rapid) source term of the Poisson equation for pressure fluctuations, $2U'\frac{\partial v}{\partial x}$. The minimum required spanwise wavelength resolution without losing control is constant at $\lambda_z^+ = 125$, based on the wall friction velocity at $t = 0$. The result shows that the maximum forcing is located at $y^+ \approx 20$, corresponding to the location of the maximum in the mean-square pressure gradient. The effectiveness of linear control is qualitatively explained by Landahl's theory for timescales, in that the control proceeds via the shear interaction timescale which is much shorter than both the nonlinear and viscous timescales. The response of the rapid (linear) and slow (nonlinear) pressure fluctuations to the linear control is examined and discussed.

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