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**Pressure fluctuations and time scales in turbulent channel flow**
KAMTHON SEPTHAM, JONATHAN MORRISON, SOURABH DIWAN, Imperial College London — Pressure fluctuations in turbulent channel flow subjected to globally stabilising linear feedback control are investigated at $Re_\tau = 400$. The passivity-based control 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 control operates via $vU'$; the maximum forcing is located at $y^+ \approx 20$, corresponding to the location of the maximum in the mean-square pressure gradient. The responses of the rapid (linear) and slow (nonlinear) pressure fluctuations to the linear control are investigated using the Green's function representations. It demonstrates that the linear control operates via the linear source terms of the Poisson equation for pressure fluctuations. Landahl's timescales of the minimal flow unit (MFU) in turbulent channel flow are examined at $y^+ = 20$. It shows that the timescales of MFU agree well with the theoretical values proposed by Landahl (1993). Therefore, the effectiveness of the linear control to attenuate wall turbulence is explained by Landahl's theory for timescales, in that the control proceeds via the shear interaction timescale which is significantly shorter than both the nonlinear and viscous timescales.

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