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Scale dependence of Reynolds stress transport in wall-bounded turbulence at $Re_\tau = 5200$[1] MYOUNGKYU LEE, ROBERT D. MOSER, University of Texas at Austin — A direct numerical simulation (DNS) of turbulent channel flow has been performed to study high Reynolds number wall-bounded turbulence. In particular, in this talk we will focus on the characteristics of the terms in the Reynolds stress transport equations in two recent channel flow DNS at $Re_\tau = 1000$ and 5200. The $Re_\tau = 5200$ case is at sufficiently high Reynolds number for there to be a significant scale separation between the near-wall and outer layer turbulence. A spectral analysis of the Reynolds stress transport terms shows how the inner- and outer-layer turbulence interact across scale. One striking result of this analysis is that over a broad range of y, the turbulent transport of turbulent kinetic energy occurs at scales that are proportional to y. There is also a weak direct interaction between the outer-layer and near-wall turbulence at large scales, presumably resulting in the large-scale modulation of near-wall turbulence. Further results from this spectral Reynolds stress transport analysis will be presented to explore the characteristics of turbulent, viscous and pressure effects.

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