Abstract Submitted
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Scale separation effects in turbulent boundary layers[1] CALEB MORRILL-WINTER, University of New Hampshire, JOSEPH KLEWICKI, University of New Hampshire, University of Melbourne — The velocity and vorticity field interactions that underlie the mean mechanism of turbulent inertia and the wall-normal variation of turbulence kinetic energy are investigated over a wide variation in Reynolds number. Existing well-resolved laboratory data, $\delta^+ = 375$, 970 & 1500, and data from the atmospheric surface layer over Utah's west desert, $\delta^+ = 890,000$, are used to establish the relevant statistical and spectral properties. The influences of scale- separation, as well as the scale selection phenomena first observed by Priyadarshana et al. (*J. Fluid Mech.* **570**, 2007) are of interest. Scale-separation is quantified using both the difference and ratio of the peak frequencies of the relevant velocity and vorticity components. The scale selection phenomena is clarified by examining the relative behavior of the spectra and associated co-spectra as a function of both y^+ and δ^+. Near the wall, scale- separation is due to the rapid spatial confinement of the vortical motions, while the scale selection correlates with the vorticity spectra. Away from the wall, scale-separation is due to the spatial dispersion of the vortical motions, and the scale selection correlates with the velocity spectra.

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