

Abstract Submitted
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An investigation of inner and outer-scaled structures in turbulent boundary layers. IVAN MARUSIC, NICHOLAS HUTCHINS, University of Minnesota — The interaction between the large outer-scaled events in the logarithmic region and the near-wall buffer region structure will be investigated. The latter consists of the now quite well defined near-wall cycle of streaks and vortices (with a dominant spanwise spacing of 100 wall units), whilst the former has been recently noted to consist of very long meandering regions of positive and negative u fluctuations (frequently exceeding 20 boundary layer thicknesses in length, and with its own associated vortical structure). Interestingly, these large outer-scaled structures maintain a footprint on the wall, seeming to modulate the near-wall cycle. This provides a mechanism for the percolation of very low wavenumber energy from the log region into the near-wall u fluctuations, explaining the Reynolds number dependence of both the streamwise energy spectra Φ_{uu} and the peak of the RMS fluctuations in the near-wall region. Recent hotwire rake measurements will be presented along with results from direct numerical simulations.

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