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Scales Interaction in Wall Turbulence MICHELE GUALA, LAURA ARMANIOS, Graduate Aeronautical Laboratories, California Institute of Technology, MEREDITH METZGER, Department of Mechanical Engineering, University of Utah, BEVERLEY MCKEON, Graduate Aeronautical Laboratories, California Institute of Technology — Recently, the role of very large scale motions in turbulent boundary layer has been significantly re-evaluated, in terms of kinetic energy and Reynolds stress contribution, (e.g. Guala et al. 2006), and as a source of strong scale interactions across the wall region (e.g. Hutchins & Marusic, 2007). Simultaneous hotwire measurements, across the vertical direction, at $Re_\tau = \delta u_\tau/\nu \simeq 10^6$ in the atmospheric surface layer, in near-neutral conditions, are analyzed by means of linear and non linear techniques to quantify interactions among turbulent scales, from the very large scale motions (of order of $6 - 10\delta$) to the dissipative scales. Results show that the "signature" of very large scale oscillations can be found in conditioned statistics of dissipation and high pass filtered velocity. Premultiplied spectra and joint PDF allows for a spectral and probabilistic description of the interaction between the various scales, while wavelet analysis and cross correlations provide information of time dependency and phase delays. We regard very large scale motions as active, with respect to their effect onto any scale, from the energy containing eddies, to the Kolmogorov scale. Data were collected at the SLTEST site, Utah (Metzger et al. 2007).

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