Abstract Submitted
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Convection of wall shear stress events in a turbulent boundary layer[1] ROMMEL PABON, Univ of Florida - Gainesville, DAVID MILLS, Interdisciplinary Consulting Corporation, LAWRENCE UKEILEY, Univ of Florida - Gainesville, MARK SHEPLAK, Univ of Florida - Gainesville, Interdisciplinary Consulting Corporation — The fluctuating wall shear stress is measured in a zero pressure gradient turbulent boundary layer of $Re_\tau \approx 1700$ simultaneously with velocity measurements using either hot-wire anemometry or particle image velocimetry. These experiments elucidate the patterns of large scale structures in a single point measurement of the wall shear stress, as well as their convection velocity at the wall. The wall shear stress sensor is a CS-A05 one-dimensional capacitice floating element from Interdisciplinary Consulting Corp. It has a nominal bandwidth from DC to 5 kHz and a floating element size of 1 mm in the principal sensing direction (streamwise) and 0.2 mm in the cross direction (spanwise), allowing the large scales to be well resolved in the current experimental conditions. In addition, a two sensor array of CS-A05 aligned in the spanwise direction with streamwise separations $\mathcal{O}(\delta)$ is utilized to capture the convection velocity of specific scales of the shear stress through a bandpass filter and peaks in the correlation. Thus, an average wall normal position for the corresponding convecting event can be inferred at least as high as the equivalent local streamwise velocity.

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