

Abstract Submitted
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A view of structures in wall-bounded turbulent flow from PIV measurements in three different planes DAVID DENNIS, TIMOTHY NICKELS, Cambridge University — High-speed PIV measurements in three different planes (streamwise-wall normal, streamwise-spanwise, and spanwise-wall normal) have been taken in the Cambridge University Engineering Department's turbulent boundary layer water tunnel research facility. This unique facility has been specially designed to produce thick turbulent boundary layers that may be measured with excellent spatial resolution. A boundary layer with $Re_\tau = 4685$, has been examined for the presence of the structures commonly described in the literature (e.g. long, meandering regions of low-momentum fluid, and hairpin vortex packets). The use of high-speed PIV enables the tracking of structures in time, as well as providing measurements that can be used to test the accuracy of Taylor's hypothesis. Once the valid extent of Taylor's hypothesis is known, it can be used to extend the length of the spatial field. The spanwise-wall normal measurements were taken using stereoscopic PIV and therefore provide all three components of the velocity vector. The instantaneous flow fields and the statistics of the flow are examined for evidence of structures.

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