

Abstract Submitted
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High speed PIV measurements in the logarithmic region of a turbulent boundary layer¹ ANURAG SINGH, ELLEN LONGMIRE, IVAN MARUSIC, Department of Aerospace Engineering and Mechanics, University of Minnesota - Twin Cities — The existence of long low speed regions in the logarithmic region of turbulent boundary layers has been studied previously; most recently using spanwise arrays of hot-wires. Currently, we are using high speed PIV to characterize these low speed regions. Experiments were conducted in the logarithmic region of the turbulent boundary layer in a zero pressure gradient flow at friction Reynolds number $Re_\tau = 1160$ with a streamwise-spanwise field of view of dimension 1.2δ . A high speed camera and laser were used to obtain velocity fields at repetition rates ranging from 250 Hz to 1000 Hz. Sets of these fields were used to compute ensemble averaged statistics. Also, sections of consecutive fields were stitched end-to-end to form longer vector fields. This allows us to test, in part, the validity of using Taylor's hypothesis in this flow. Within the field of view, low speed regions of up to 14δ in length have been observed. In general, these low speed regions meander and some go out of the field of view in the spanwise direction. An algorithm is being developed to identify these regions automatically from the PIV results and to characterize their length scales.

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Anurag Singh

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