Abstract Submitted
for the DFD19 Meeting of
The American Physical Society

Observing Reversing Flow in Low Speed Streaks of a Separating Turbulent Boundary Layer[1] SARAH FOLEY, University of Colorado Boulder, AMY LANG, LEO SANTOS, ANDREW BONNACI, CHASE PARSONS, University of Alabama — For the improvement of flow control and drag reduction, a better fundamental understanding of the flow physics is essential. A separating turbulent boundary layer over a flat plate was studied in search of boundary layer structures such as low speed streaks and vortices. A V3V system was used to capture the 3D3C velocity measurements within a boundary layer in a water tunnel study at three different Re, while a rotating cylinder placed in the flow induced an adverse pressure gradient (APG). After identifying low speed streaks, a statistical characterization was conducted, including length and width, peak reversing velocity, location of peak velocity, and duration. It was found that the length and peak reversing velocity both increase with increasing Re, while the duration of the streaks and width show little to no correlation to Re. It was also found that the location of peak reversing velocity tended to move upstream towards the rotating cylinder with increasing Re and strength of APG. Evidence was also seen of streamwise vortices which may be the legs of hairpin vortical structures that are thought to be the mechanism of low speed streak formation. These vortices may be connected to the formation of low speed streaks and subsequent reversing flow leading to separation of the boundary layer.

[1]NSF REU Grant EEC 1659710, Army Research Office Grant W911NF-15-1-0556

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Date submitted: 26 Jul 2019 Electronic form version 1.4