Abstract Submitted
for the DFD14 Meeting of
The American Physical Society

A Visualization Study of Wall Layer of Swirling Turbulent Pipe Flow MERIAM MALEK[1], RACHAEL HAGER, OMER SAVAS, University of California-Berkeley — The streaky vortical structure of the viscous sublayer of a turbulent boundary layer is well known. Turbulent flows in pipes also exhibit similar structures. The effect of swirl on that structure is the subject matter of this study. The experiments are conducted in water in a 5-cm diameter clear cast-acrylic pipe at Reynolds numbers up to 80,000. Initial geometric swirl angles up to 60° at the wall are generated by placing 3D printed inserts at the inlet of the pipe. Flows are visualized using reflective flakes of size distribution 10-80 μm under diffuse illumination. Flows are recorded at high framing rates. After preprocessing, the streaky structure is quantified by using autocorrelation of the images. Lateral spacing and longitudinal length scales are extracted. Also studied is the decay of the swirl angle and its influence of the wall structure.

[1]Undergraduate Researcher

Omer Savas
University of California-Berkeley

Date submitted: 01 Aug 2014 Electronic form version 1.4