

Abstract Submitted
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Concentration Measurements in a Polymer Drag Reduced Boundary Layer GODFREY MUNGAL, Professor, VIJAY SOMANDEPALLI, Graduate Student, YONGXI HOU, Research Associate, Mechanical Engineering Department, Stanford University — The addition of dilute polymer solutions to turbulent wall bounded flows can cause a significant reduction in the skin friction drag. This drag reducing effect of polymers, called the Tom's effect, has been well known for more than 50 years now. However, there is limited understanding of the physics behind this phenomenon of drag reduction. In our work, PLIF and PIV are used to study the distribution of a slot-injected polymer solution along the length of a developing flat plate boundary layer for various drag reductions and flow conditions. PLIF-based concentration measurements of the injected polymer solution will be presented for various polymer concentrations. Turbulent fluxes obtained from combining PLIF measurements with simultaneous PIV measurements are used to study the streamwise evolution and distribution of the polymer across the boundary layer and along the length of the tunnel. These statistics help in improved understanding of the dispersion of the polymer, its effects on the boundary layer and, as a consequence, the physics of polymer drag reduction.

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