

Abstract Submitted
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Lessons learned from polymer drag reduction on near-wall turbulence¹ YVES DUBIEF, University of Vermont — We use the unique drag-reduction ability of polymer additives to study the response of the self-sustaining process (SSP) of near-wall turbulence. Recent numerical studies of turbulent polymer flows have demonstrated that polymers are responsible for the weakening of near-wall vortices. The intermittent interaction between vortices and polymers occurs predominantly in bi-axial extensional flows that characterize the upward and downward fluid motions induced by vortices. The present study focuses on the correlation of the elastic properties of polymer solutions and the corresponding SSP of the drag-reduced near-wall turbulence. Polymers are used to outline self-induced energy transfers that occur between vortices and bi-axial extensional flows. The study of energy fluxes through vortex cores is correlated with equilibrium states that vortices reach within the SSP in response to given elastic properties of polymer solutions. The talk will end with a comparison between polymer drag reduction and other control techniques.

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