

Abstract Submitted  
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**A comparison of polymer and surfactant drag-reduced flows** LUCAS WARWARUK, SINA GHAEMI, University of Alberta — Small concentrations of polymers and surfactants can cause drag reduction in turbulent liquid flows by as much as 80%. Whether different additives inhibit drag in a similar manner, remains an enigma. We directly compared the steady shear viscosity, extensional rheology, and velocity statistics in a turbulent channel flow, for solutions of a flexible polymer, a rigid polymer and a surfactant. The rigid polymer had the largest shear viscosity, while the flexible possessed the largest extensional characteristics. Lagrangian three-dimensional particle tracking velocimetry was used to measure the turbulence statistics. Measurements were performed at a constant high drag reduction (HDR) of 55%, and maximum drag reduction (MDR), of 75%. The surfactant and the flexible polymer solutions showed similarities in their mean velocity and Reynolds stresses at both HDR and MDR. The mean velocity and Reynolds stresses for the rigid polymer did not overlap with the other additives. However, the discrepancy was small and it was associated with the higher shear viscosity of the rigid polymer solution.

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