Abstract Submitted
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Temporal and spatial intermittencies within Newtonian turbulence[1] ANUBHAV KUSHWAHA, MICHAEL GRAHAM, Univ of Wisconsin, Madison — Direct numerical simulations of a pressure driven turbulent flow are performed in a large rectangular channel. Intermittent high- and low-drag regimes within turbulence that have earlier been found to exist temporally in minimal channels have been observed both spatially and temporally in full-size turbulent flows. These intermittent regimes, namely, "active" and "hibernating" turbulence, display very different structural and statistical features. We adopt a very simple sampling technique to identify these intermittent intervals, both temporally and spatially, and present differences between them in terms of simple quantities like mean-velocity, wall-shear stress and flow structures. By conditionally sampling of the low wall-shear stress events in particular, we show that the Maximum Drag Reduction (MDR) velocity profile, that occurs in viscoelastic flows, can also be approached in a Newtonian-fluid flow in the absence of any additives. This suggests that the properties of polymer drag reduction are inherent to all flows and their occurrence is just enhanced by the addition of polymers. We also show how the intermittencies within turbulence vary with Reynolds number.

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