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The viscoelastic range in wall turbulence of dilute polymers ELISABETTA DE ANGELIS, University of Bologna, CARLO MASSIMO CASCIOLA, RENZO PIVA, University of Roma — A small amount of long chain polymers dissolved in an otherwise Newtonian flow is known to reduce dramatically drag in wall bounded flows. This corresponds to an alteration in the mean velocity profile, where the slope the log-law of the wall passes from 2.5 to 11.7 One of the relevant parameters in such flows is the ratio of two times scales, namely the Deborah (or Weissemberg) number $De_* = \tau_\mathrm{p}/\tau_*$. Here $\tau_* = \nu/u_*^2$ is the friction time scale and τ_p is the principal relaxation time of the polymeric chain, the estimated time needed to recover equilibrium after the external strain is removed. This opens the way for an hyper-simplified description of the polymer, as a system with a single internal degree of freedom, the resulting model is called Oldroid-B. A set of numerical simulations at constant friction Reynolds number $Re_* = u_* h/\nu$, where h is the channel half-width, have been performed varying the value of Deborah, De_*. From these data, the viscoelastic ranges at different distances from the wall will be discussed by means of a scale by scale kinetic energy budget.

Elisabetta De Angelis
University of Bologna

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