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Turbulence scalings in pipe flows exhibiting polymer-induced drag reduction IVAN ZADRAZIL, CHRISTOS MARKIDES, Imperial College London — Non-intrusive laser based diagnostics technique, namely Particle Image Velocimetry, was used to in detail characterise polymer induced drag reduction in a turbulent pipe flow. The effect of polymer additives was investigated in a pneumatically-driven flow facility featuring a horizontal pipe test section of inner diameter 25.3 mm and length 8 m. Three high molecular weight polymers (2, 4 and 8 MDa) at concentrations of 5 – 250 wppm were used at Reynolds numbers from 35000 to 210000. The PIV derived results show that the level of drag reduction scales with different normalised turbulence parameters, e.g. streamwise and spanwise velocity fluctuations, vorticity or Reynolds stresses. These scalings are dependent of the distance from the wall, however, are independent of the Reynolds numbers range investigated.

Ivan Zadrazil
Imperial College London

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