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Shear rate threshold for the onset of boundary slip in dense polymer films[1] NIKOLAI PRIEZJEV, Michigan State University — Molecular dynamics simulations are carried out to investigate the dynamic behavior of the slip length in thin polymer films confined between atomically smooth surfaces. The polymer melt is modeled as a collection of bead-spring chains of 20 Lennard- Jones monomers interacting through the FENE potential. We found that at high melt densities and low shear rates the fluid velocity profiles acquire a pronounced curvature near the walls and the slip length is approximately equal to the thickness of the immobile boundary layer. The linearity of the fluid velocity profiles is restored at higher shear rates where the slip length increases rapidly as a function of shear rate. We will show that the friction coefficient at the interface between a polymer melt and a solid wall follows power law decay as a function of the slip velocity. At large slip velocities the friction coefficient is determined by the product of the value of surface induced peak in the structure factor and the contact density of the first fluid layer near the solid wall. A relation to recent slip flow experiments is discussed.

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Nikolai Priezjev
Michigan State University

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