Abstract Submitted
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Velocity-dependent friction coefficient at the interface between a polymer melt and a solid substrate NIKOLAI PRIEZJEV, ANOOSHEH NIAVARANI, 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 thermal surfaces. For weak wall-fluid interactions, the shear rate dependence of the slip length acquires a distinct local minimum followed by a rapid growth at higher shear rates. With increasing the fluid density, the position of the local minimum is shifted to lower shear rates. We found that the ratio of the shear viscosity to the slip length, which defines the friction coefficient at the liquid/solid interface, undergoes a transition from a nearly constant value to the power law decay as a function of the slip velocity. In a wide range of shear rates and fluid densities, 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. Reference: A. Niavarani and N.V. Priezjev, Phys. Rev. E (2008) (cond-mat/0711.0178).

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