A reptation slip model for fast flow of polymer melts

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Molten polymers slip macroscopically at solid surfaces no matter how small are the applied wall shear stresses. Moreover, for linear polymers there exists a critical wall shear stress value at which a transition from a weak to a strong slip occurs. These two modes of slip (weak and strong) are due to *flow-induced chain detachment/desorption* at the polymer/wall interface and to *chain disentanglement* of the polymer chains in the bulk from a monolayer of polymer chains adsorbed at the interface depending on the surface energy. In this talk, the slip of linear polymers is discussed with emphasis on the effects of molecular weight and its distribution. A methodology based on double reptation to calculate the slip velocity given the detailed molecular weight distribution of the polymer is also discussed. The scaling of slip with shear stress, molecular weight considering also segregation effects (thermodynamically driven) are part of the comprehensive slip model presented.