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Influence of Short-Range Interactions on Wall-Slip in Microgel Pastes JYOTI SETH, The University of Texas at Austin, MICHEL CLOITRE, ESPCI, ROGER BONNECAZE, The University of Texas at Austin — Microgel pastes are complex fluids that behave like elastic solids at rest but flow like viscous fluids when sheared with a stress greater than the yield value. The nature of the yielding transition depends on whether the shearing surface is rough or smooth. In the former, the paste yields at the bulk yield stress σ_y and exhibits a uniform bulk flow at higher stresses. But when sheared with a smooth wall the paste continues to move and eventually stops at a much lower stress σ_s. The slip mechanism at lower stresses and the physical origin of σ_s remain two important unsolved issues. In this talk we analyze how the nature of the shearing surface influences wall slip. We present experiments performed with different shearing surfaces and varying paste properties. Two distinct slip behaviors are identified: depending on whether the interaction between the microgel particles and the wall is attractive or repulsive, wall slip can be either suppressed or promoted. We also propose a slip model, which is based on elastohydrodynamic lubrication with possible adhesion or repulsion due to short-range interactions between the microgel and the shearing surface. The onset of slip is determined from a balance between the interaction forces and the elastohydrodynamic lift generated by lubrication. The predicted relationships agree well with the experimental results.

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