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Flow boundary conditions for fluid mixtures at solid walls and moving contact lines[1] MARK ROBBINS, Johns Hopkins University and Univ. of California, Santa Barbara — Molecular simulations of slip at solid surfaces have focused on single component systems, but polymers are frequently blended to optimize performance. This talk will examine counterintuitive behavior that can arise when binary fluid mixtures flow past stationary solid walls in simple shear and at moving contact lines. In general the velocities of the two species do not go to zero at the walls. In addition to the slip found for single fluids, there may be velocity discontinuities due to diffusive fluxes and to interfacial forces when there is a concentration gradient.[1] Cases where the fluid velocity is largest near the wall and where the apparent slip length diverges will be shown, and a general boundary condition for multi-phase flow presented. The no-slip boundary condition leads to singular dissipation when the contact line between a fluid interface and solid moves, but it was suggested that a diffusive flux could remove this singularity.[2] The flow and stress near moving contact lines are analyzed for a range of interfacial widths, velocities and interactions. A significant diffusive flux is only observed in the layer closest to the solid and is not sufficient to remove the singularity. Instead, the finite molecular size and non-Newtonian effects cutoff the singularity.
1. C. Denniston and M. O. Robbins, Phys. Rev. Lett. **87**, 178302 (2001).
2. H.-Y. Chen and D. Jasnow and J. Vinals, Phys. Rev. Lett. **85**, 1686 (2000).

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