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Clarifying some basic consequences of confinement for fluids

It is widely appreciated that both molecular and colloidal fluids confined to small spaces behave differently than they do in the bulk. These differences have generated interest because confined fluids feature prominently in both nature and technology. Examples include dynamics of water near proteins or in concentrated cellular environments, transport processes across biological membranes, and fluid flows encountered in micro- or nanofluidic devices, to mention a few. Given that a significant fraction of the molecules (or particles) in these systems populate highly inhomogeneous interfacial environments, it is easy to appreciate why confinement might have nontrivial consequences for their thermodynamic properties and transport coefficients (e.g., diffusivity and viscosity). In this talk, we explore how computer simulations and liquid-state theory can be leveraged to understand the classical effects of confinement. The key insight is that while many individual properties of confined fluids are significantly modified relative to the bulk, a few relationships between those properties are not. We discuss how this insight naturally leads to new and straightforward means for predicting a priori the behaviors of confined fluids.

FRIDAY, APRIL 20, 2007
2:00 – 3:00 p.m.
BOGGS ROOM 243

Refreshments will be served before the seminar.