

# Dialing-in Disorder and Dynamics in Dense Complex Fluids

**Thomas TRUSKETT**

The University of Texas at Austin  
Department of Chemical Engineering  
1 University Station C0400  
Austin, TX 78712-0231  
U.S.A.

Complex fluids, such as dense particle suspensions, exhibit rich static and dynamic behaviors. Although successful a priori prediction of the former is often possible from equilibrium statistical mechanical theory, accurate theories for dynamic properties have proven elusive. In this talk, I review what computer simulation studies of model systems have recently taught us about the relationships between structure and dynamics of complex fluids in both homogeneous and inhomogeneous environments. Specifically, I discuss which experimentally measurable (and theoretically predictable) aspects of structure reliably track the dynamical trends of these systems, and which do not. I then outline the ways in which knowledge of these structure-dynamics relationships can be used together with tools of materials science to “tune” the transport coefficients of particle suspensions or confined fluids.