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Lattice methods for slow flows in non-ideal fluids

Abstract:

Exchange of linear momentum at the molecular level leads to long tails in time and spatial correlations. This renders molecular methods prohibitively expensive to account for flow in all but the smallest systems. On the other hand, methods based on the solution of macroscopic, continuum equations cannot account for particulate effects other than by imposing macroscopic constitutive equations, and require high sophistication in dealing with interface tracking. In this course we will focus on lattice-gas and lattice-Boltzmann automata as simpler alternatives in the study of mesoscale flow in non-ideal fluids. In three lectures the course will cover fundamentals plus some applications into phase segregation, electro-osmotic flow and amphiphilic assembly.