Athermal Jamming Vs Thermalized Glassiness in a Simple Model of Soft-Core Interacting Particles

STEPHEN TEITEL, University of Rochester, PETER OLSSON, Umeå University

— Numerical simulations of soft-core frictionless disks in two dimensions are carried out to study shear viscosity $\eta$ and pressure $p$ of a simple model liquid, as a function of thermal temperature $T$, packing fraction $\phi$, and uniform applied shear strain rate $\dot{\gamma}$. We find that viscosity in the athermal hard-core limit, $\lim_{\dot{\gamma}\to 0}\lim_{T\to 0}\eta$, is singularly disconnected from viscosity in the hard-core thermal limit, $\lim_{T\to 0}\lim_{\dot{\gamma}\to 0}\eta$, demonstrating that thermal glassy behavior is not governed by the athermal jamming critical point, “point J”.

Work supported by Department of Energy Grant No. DE-FG02-06ER46298 and Swedish Research Council Grant No. 2010-3725. Simulations were performed on resources provided by the Swedish National Infrastructure for Computing (SNIC) at PDC and HPC2N.

Stephen Teitel
University of Rochester

Date submitted: 09 Nov 2011

Electronic form version 1.4