Abstract Submitted
for the MAR12 Meeting of
The American Physical Society

Statistical Mechanics of Athermal Packings: Incorporating Basin Volumes ASHWIN S. S., Departments of Mechanical Engineering & Materials Science and Physics, Yale University, JERZY BLAWZDZIEWICZ, Mechanical Engineering,Texas Tech University, COREY S. O'HERN, Departments of Mechanical Engineering & Materials Science and Physics, Yale University, MARK D. SHATTUCK, Benjamin Levich Institute and Physics Department, The City College of the New York — We present a first principles formalism for the statistical mechanics of athermal packings subject to driving beyond the weak limit. Edwards hypothesized a statistical mechanics of flat measure associated with packings explored at fixed density. This ensemble has been found to work well in the limit of very weak (but non-zero) driving. Beyond the weak driving limit, the probability measures associated with jammed states become proportional to the volume of basins of attractions associated with the packings on the density landscape. We propose here, a statistical mechanics which takes into consideration the volume of basins of attraction under certain approximations. Further, the statistical mechanics takes into account the protocol by writing the partition function in terms of an integral over protocol dependent generalized coordinates. This will allow an extremum principle to determine states, in these out of equilibrium systems.

Ashwin S. S.
Departments of Mechanical Engineering &
Materials Science and Physics, Yale University

Date submitted: 12 Dec 2011 Electronic form version 1.4