Abstract Submitted
for the MAR09 Meeting of
The American Physical Society

Equilibration in model granular subsystems: An experimental test for Edwards' compactivity FREDERIC LECHENAULT, JAMES PUCKETT, KAREN DANIELS, NCSU — We experimentally investigate the statistical features of the stationary states reached by two idealized granular liquids able to exchange volume. The system consists in two binary mixtures of the same number (and area) of soft disks, but with different surface properties. The disks sit on a horizontal air table and are separated by a mobile wall. Energy is injected in the system by means of an array of randomly activated coil bumpers standing as the edges of the cell. Due to the energy injection, the system acts like a slow liquid and eventually jams at high packing fraction. We characterize the macroscopic states by studying the motion of the piston. We find that its average position is different from one half, and is a non monotonic function of the overall packing fraction, which reveals the crucial role played by the surface properties in the corresponding density of states. We then study the bulk statistics of the packing fraction and find confirmation of the macroscopic behavior. However, the local fluctuations of the packing fraction are uniquely determined by its average, and hence independent of the interaction between disks. This result, together with the existence of a point at which the two sub-systems have the same volume, enables us to show that Edwards' compactivity does not have the same value in the two equilibrated subsystems.

Frederic Lechenault
NCSU

Date submitted: 23 Nov 2008 Electronic form version 1.4