Abstract Submitted
for the MAR06 Meeting of
The American Physical Society

Measurement of Forces inside Three-Dimensional, Frictionless, Disordered Matter JING ZHOU, ANTHONY DINSMORE, University of Massachusetts at Amherst — We directly measured individual forces inside the concentrated piles of frictionless droplets. We report on the distribution of contact forces normalized by the droplet mean, in addition to the distribution of forces normalized by sample mean, as well as the distribution of contact angles. We compare these results to existing models and to a new, numerical calculation that treats the droplets as independent particles and derive the contact-force probability distribution that arises self-consistently from balancing forces. The force chain architecture was visualized, and quantified with a new definition based on long-range correlations. The obtained chain persistence length helps to establish a connection between microscopic force network and the modulus of meso- or macroscopic piles. This work is supported by NSF (DMR-0305395).

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Date submitted: 29 Nov 2005 Electronic form version 1.4