Abstract Submitted
for the MAR16 Meeting of
The American Physical Society

Wrinkles and folds in a compressed granular raft ETIENNE JAMBON-PUILLET, CHRISTOPHE JOSSERAND, SUZIE PROTIERE, Institut Jean le Rond d'Alembert, Univ Paris 6 UPMC, CNRS UMR 7190, France — Wrinkles and folds occur in a wide variety of situations, we find them in Nature but also in man-made products. They typically appear when a thin sheet bound to a foundation is compressed. Here we demonstrate that particle ladden interfaces, despite being made of discrete very hard particles, can form wrinkles and folds like a soft elastic solid. We call granular raft a close packed monolayer of heavy, athermal particles at the interface between two fluids. We use beads of different materials with diameters ranging from 30 μm to 0.8 mm dispersed at a planar oil/water interface. Upon uniaxial compression the raft buckles out of plane like a soft elastic solid and forms a periodic wrinkling pattern, then the deformation localizes in a large unique fold/crease. This behavior is reminiscent of a compressed elastic sheet floating on water. We will highlight similarities and differences between the mechanical properties of our discrete heavy granular raft and a continuous elastic floating film. Finally we will show how elasticity and gravity contribute to rationalize the original shape of the fold we observe.

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Date submitted: 04 Nov 2015 Electronic form version 1.4