CENTER FOR FLUID MECHANICS
AND
THE FLUIDS, THERMAL AND CHEMICAL PROCESSES GROUP
OF
THE DIVISION OF ENGINEERING
SEMINAR SERIES

Michael Berhanu
Coworkers : Darija Cosic and Pr. Arshad Kudrolli
Clark University
Department of Physics
Worcester MA

Granular Aggregates with Capillary Interactions

We consider assembly of identical spherical particles (of diameter about 3 mm) floating on the surface of a viscous liquid. Interface deformation and gravity create attractive interactions between particles, leading to capillary aggregation. Firstly, features of this phenomena are experimentally investigated for a small number of particles to understand self-organization of floating spheres. Then for a large number of particles, density is homogeneously increased. Dense aggregates are formed and we investigate structure of such a cohesive granular medium as a function of area fraction. Using Voronoi tesselation, heterogeneity is characterized. Moreover significant short range order is found, by computing pair correlation function and orientational order parameter. This two-dimensional example demonstrates that structure of an athermal system of attractive particles contrasts strongly with the cohesionless case. When density is increased, heterogeneity decreases and steric effects become more important compared to attraction of particles. Finally jamming transition is reached, inducing the buckling of the aggregate.

TUESDAY, MAY 11, 2010
APPLIED MATHEMATICS BUILDING
182 GEORGE STREET
ROOM 110
3:00pm