Massachusetts Institute of Technology
Department of Mechanical Engineering

MMEC SEMINAR SERIES

Mechanics: Modelling, Experimentation, Computation

Tuesdays @ 4:00pm – Room 3-370 **April 29, 2014**

Randomness, Hyperuniformity, and Maximally Random Jammed Packings

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Understanding the characteristics of jammed particle packings provides basic insights into the structure and bulk properties of crystals, glasses, and granular media as well as the nature of randomness. The "geometric structure" approach to jamming stresses the characterization of individual jammed configurations, regardless of how frequently they occur, and the characterization of the degree of order/disorder of the packings.

Application of these analytical tools to sphere packings in three dimensions covers a myriad of jammed states, including maximally dense packings (as Kepler conjectured), low-density strictly jammed tunneled crystals, and a substantial family of amorphous packings, including the maximally random jammed (MRJ) state. MRJ states of spheres as well as nonspherical particles (ellipsoids, superballs and polyhedra) will be described in some detail. It has recently come to light that general MRJ packings are "hyperuniform", i.e., infinite-wavelength density fluctuations vanish.

Disordered hyperuniform materials can be regarded to be a new distinguishable state of matter that are intermediate between a perfect crystal and an isotropic liquid. Such materials possess a "hidden order" on large length scales that is not apparent on small length scales.

Seminar Host: Ken Kamrin (kkamrin@mit.edu)

*Please join us for **refreshments beforehand, outside Room 3-370***

For more information, visit our website at http://web.mit.edu/mmec/
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