Abstract Submitted
for the DFD16 Meeting of
The American Physical Society

Vibrational Collapse of Hexapod Packings[1] YUCHEN ZHAO, Department of Physics, Duke University., JINGQIU DING, Department of Physics, Nanjing University, Nanjing, P.R.C., JONATHAN BARÉS, Laboratoire de Mécanique et Génie Civil, Université de Montpellier, Montpellier, France, KAROLA DIERICHS, Institute for Computational Design, University of Stuttgart, Stuttgart, Germany , ROBERT BEHRINGER, Department of Physics, Duke University. —
Columns made of convex noncohesive grains like sand collapse after being released from a confining container. However, structures built from concave grains can be stable without external support. Previous research show that the stability of the columns depends on column diameter and height, by observing column stability after carefully lifting their confinement tubes. Thinner and taller columns collapse with higher probability. While the column stability weakly depends on packing density, it strongly depends on inter-particle friction. Experiments that cause the column to collapse also reveal similar trends, as more effort (such as heavier loading or shearing) is required to destabilize columns that are intrinsically more stable. In the current experiments, we invesitage the effect of vibration on destructing a column. Short columns collapse following the relaxation dynamics of disorder systems, which coincides with similar experiments on staple packings. However, tall columns collapse faster at the beginning, in addition to the relaxation process coming after. Using high-speed imaging, we analyze column collapse data from different column geometries. Ongoing work is focusing on characterizing the stability of hexapod packings to vibration.

[1]We thanks NSF-DMR-1206351 and the William M. Keck Foundation

Yuchen Zhao
Department of Physics, Duke University.

Date submitted: 01 Aug 2016 Electronic form version 1.4