SES13-2013-000056

Abstract for an Invited Paper
for the SES13 Meeting of
the American Physical Society

Statistical Properties of Granular Materials[1]

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This talk will consider the statistical properties of granular materials in several settings. One of these will be near-jamming behavior of granular systems. We have recently shown that there exists a range of packing fractions for which it is possible to start from zero stress, and by applying shear strain, traverse a regime of fragile highly anisotropic states with long filimentary force networks, ultimately arriving at a jammed state. The emergence of these states can be thought of as an order-disorder transition, characterized by the stress and contact anisotropy. The largest density for which shear jamming occurs is comparable to the isotropic jamming density of frictionless particles, and the lowest density for which this occurs is comparable to the random loose packing density. Interestingly, similar states arise when a fast heavy object, such as meteor, impacts a granular material. In this case, the propagation of acoustic signals along force networks are responsible for stopping the intruding object. This talk will describe the emergence of shear jammed states, and their statistical and dynamical properties. It will also demonstrate the role of force networks for granular impacts.

[1]Supported by: NSF-DMR, NSF-DMS, NASA, ARO, DTRA