Granular flows : fluidization and anisotropy

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Propositions

accompanying the thesis

Granular Flows: Fluidization and Anisotropy

1. The rheology of weakly vibrated granular materials is pressure dependent and frictional, but becomes pressure independent and liquid-like when the peak acceleration approaches gravity.
   Chapter 3 of this thesis

2. The slow and fast flowing states in weakly vibrated granular materials are fundamentally different and are separated by a second-order critical point.
   Chapter 4 of this thesis

3. Flow makes granular materials anisotropic, and the amount of anisotropy is determined by the shear stress.
   Chapter 5 of this thesis

4. The continuous reorientation of rods in shear flow can drive significant secondary flows.
   Chapter 6 of this thesis

5. The assumption that a granular system is temperature independent is inconsistent with many practical applications because of the role of thermal expansion.
   K. Chen et al., *Nature* **442**, 257 (2006)

6. The soft robotic gripper would be even more versatile if, instead of air pressure, a rotating wheel in the granular packing were used to control the gripper's stiffness.
   E. Brown et al., *Proc. Natl. Acad. Sci.* **107**, 18809 (2010)

7. In eye-catching soft matter experiments, such as the dropping of cooked spaghetti on a conveyer belt, there is a subtle balance between elegant physics and practical applications.
   S. Chiu-Webster et al., *J. Fluid Mech.* **569**, 89 (2006)

8. Often the greatest understanding comes from varying a control parameter whose influence is not a priori evident. A surprising example is the dependence of the angle of repose of a glass sphere packing on an electric field.
   J.-F. Métayer et al., *J. Stat. Mech.* **8**, P08003 (2010)

9. A confusing aspect of the jamming point is that one has the natural tendency to think of approaching it from the unjammed state, whereas in research it is typically approached from the jammed side.

10. If you cannot find something on the internet, it is either too specialized or too trivial.

11. The chess community has to accept that computers are significantly better at chess than humans, despite their different playing style.