Patterns in Vertically Oscillated Granular Layers: Experiment and Simulation

Vertically oscillated layers of grains provide an important testbed for studying the physics of granular materials. I will present an ongoing undergraduate experimental research project investigating the self-organization of granular media. When shaken vertically and sinusoidally, grains self-organize into patterns such as squares, stripes, and hexagons. Using a modified subwoofer I have built an apparatus to fluidize grains so that granular phenomena can be examined. I will present results in granular media, fluids, and non-newtonian fluids. Fluids provide a strong motivation to take a hydrodynamic approach for modeling granular flows. This experimental project is designed to complement an ongoing computational study of hydrodynamic models of granular media, and can be extended beyond pattern formation to study other granular phenomena. Finally, this experimental component was initiated by an undergraduate student, illustrating the importance of student initiative in establishing research opportunities.