Abstract Submitted
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Collapse of Hexapod Packings under Vibration[1] YUCHEN ZHAO, Duke University, JINGQIU DING, Nanjing University, JONATHAN BARÉS, Université de Montpellier, HU ZHENG, Duke University, KAROLA DIERICHS, ACHIM MENGES, University of Stuttgart, ROBERT BEHRINGER, Duke University — Columns made of convex non-cohesive grains like sand collapse after being released from a confining container. However, structures built from non-convex grains can be stable without external support. Our previous research shows that 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 columns to collapse also reveal a similar trend, as more effort (such as heavy loading or shearing) is required to destabilize columns that are intrinsically more stable. In the current experiments, we investigate the effect of vibration on destroying stable columns of hexapods. Under vertical, sinusoidal vibrations, the collapses of short columns are well approximated by stretched exponentials, a function which has successfully described relaxation of disordered systems including collapse of stable 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 subjected to vibration.

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