

Abstract Submitted
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Transitional Granular Packing: Rate-dependent Brittleness

CHENG-EN TSAI, National Central Univ. , JC TSAI, Institute of Physics, Academia Sinica — We discover a route of transition over driving rate that bridges two classic regimes of granular dynamics: fluid-lubricated suspension on the fast end, against the largely plastic regime at the slow limit. Here, densely packed centimeter-sized PDMS particles submerged in fluid are sheared at variable but strictly constant rates. Fluctuations on multiple components of boundary force reveal a transitional regime exhibiting brittle failure of the packing at the intermediate driving rates, accompanied by evidence from simultaneous internal imaging. Rate-dependent statistical distribution of avalanches reveals the development of ductility toward the slow limit.

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