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Unjamming of a granular sediment with high-intensity ultrasound PIERRE LIDON, SÉBASTIEN MANNEVILLE, NICOLAS TABERLET, Ecole Normale Superieure de Lyon — Despite an increasing number of experimental, numerical and theoretical studies during the last decades, a comprehensive understanding of the jamming transition in disordered materials is still lacking. Among the wide variety of jammed materials, granular media are model athermal systems and have emerged as ideal candidates to study jamming, although solid friction between grains complexifies the jamming phase diagram. In this work, we study the unjamming of a granular sediment immersed in water. While fluidization is generally induced by shaking the walls of the container or by shearing the granular material, here we use high-intensity focused ultrasound to apply a remote force on the grains through nonlinear acoustic effects. We first study the fluidization dynamics by performing particle image velocimetry from high speed movies. Then we show that the unjamming transition displays hysteresis when the granular sediment is submitted to cycles of pulses with varying amplitude. We moreover report intermittent fluidization when series of pulses at constant amplitude are sent on the pile. Finally we performed molecular dynamics simulations to account for the observed phenomena.

Pierre Lidon
Ecole Normale Superieure de Lyon

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