Abstract Submitted
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**Granular avalanches due to non-linear acoustic waves** JULIEN LEOPOLDES, ARNAUD TOURIN, XIAOPING JIA, Institut Langevin, ESPCI Paris — We investigate how unjamming of granular media by shear is modified by transmitted ultrasound. We show that, above a critical wave amplitude, the sound-matter interaction is irreversible. Moreover, the wave velocity (elastic modulus) decreases because of the strong modification of the force network, as shown by the correlation function of the multiply scattered Coda waves[1]. Then, we illustrate the consequences of such a softening with some experiments where a granular layer brought to an inclination below the angle of avalanche $\theta_m$ is destabilized by acoustic waves. Such avalanches are triggered at small sound amplitudes, close to the metastable state, and occur because of the decreased friction between the particles[2] [3]. Well-below $\theta_m$, the resulting dynamics is slow and the creeplike flow depends on the amplitude of the acoustic waves. This dependance is no longer observed close to $\theta_m$ where the flow is inertial. Our results provide insights on how mechanical noise affects the rheology of granulars.

[1]X. Jia, T. Brunet and J. Laurent. Phys. Rev. E 84, 020301(R) (2011)
[2]J. Léopoldès, G. Conrad and X. Jia , Phys. Rev. Lett. 110, 248301 (2013)
[3]J. Léopoldès, A. Mangeney, A. Tourin and X. Jia, to be submitted

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