

Abstract Submitted
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Stick-Slip and the Transition to Sliding in a 2D Granular Medium and a Fixed Particle Lattice¹ ROBERT BEHRINGER, Duke University, JACKIE KRIM, NC State University — We report an experimental study of stick-slip to steady sliding for a solid object pulled via a spring across 2D granular substrates of photoelastic disks that are either fixed in a solid lattice or unconstrained, i.e. a disordered granular bed. We observe a progression of friction regimes with increasing sliding speed: single, mixed, and double slip-stick regimes, steady sliding, and inertial oscillations. For the granular bed, we characterize frictional behavior for the low speed stick-slip regime, including spring and elastic energy dependencies. For the granular solid, we explore friction with/without externally applied vibrations, and compare to sliding on a granular bed. We find that external vibration reduces transition values for both the single to double slip transition and the stick-slip to steady sliding transition. Moreover, we observe that the effect of packing disorder on granular friction appears similar to the effect of vibration induced disorder, a result that to our knowledge has not been reported previously in the experimental literature.

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Robert Behringer
Duke University

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