

Abstract Submitted
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Statistics from granular stick-slip experiments¹ AGHIL ABED ZADEH, JONATHAN BARES, ROBERT P. BEHRINGER, Duke University — We carry out experiments to characterize stick-slip for granular materials. In our experiment, a constant speed stage pulls a slider which rests on a vertical bed of circular photoelastic particles in a 2D system. The stage is connected to the slider by a spring. We measure the force on the spring as well as the slider's acceleration by a force sensor attached to the spring and accelerometers on the slider. The distributions of energy release and time duration of avalanches during slip obey power laws. We apply a novel event recognition approach using wavelets to extract the avalanche properties. We compare statistics from the wavelet approach with those obtained by typical methods, to show how noise can change the distribution of events. We analyze the power spectrum of various quantities to understand the effect of the loading speed and of the spring stiffness on the statistical behavior of the system. Finally, from a more local point of view and by using a high speed camera and the photoelastic properties of our particles, we characterize the internal granular structure during avalanches.

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