

Abstract Submitted
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From episodic avalanching to continuous flow in a granular drum

NEIL BALMFORTH, University of British Columbia, JIM MCELWAIN, University of Durham — Experiments are performed with a rotating cylindrical drum half full of granular material in order to study the transition from episodic avalanching to continuous flow (slumping to rolling). To examine the effect of drum and particle geometry, drums with different radii and widths are used, and different granular materials, ranging from glass spheres with different radii to irregularly shaped sand. For the drums and materials used, it is found that the transition mostly takes the form of a blend of the characteristics of episodic avalanching and continuous flow, that gradually switches from slumping to rolling as rotation rate increases. Only for the sand in the narrower drums is there a hysteretic transition in which one can observe prolonged episodic avalanching or continuous flow at the same rotation rate, over a window of rotation speeds. The transition takes the form of intermittent switching driven by noisy fluctuations (a “bifurcation by intermittency”) for sand in the widest drums and for the smallest ballotini (1mm diameter).

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