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Particle trajectories in 2D granular avalanches with imposed vibrations NORA SWISHER, BRIAN UTTER, James Madison University — We study particle trajectories of photoelastic grains in a 2D circular rotating drum subjected to imposed vertical vibrations in order to characterize the jamming behavior of granular materials. Jamming appears in many systems (grain silos & chutes, landslides, mixing industrial materials, etc.) and vibration (granular temperature) is a primary factor in the jamming/unjamming transition. Images are taken and each particle's position is found for every frame then compared between frames to find the velocities. Particle tracking allows us to quantitatively measure the flow and mixing properties in our experiment. We present data on avalanching statistics, mean flow, the width of the shear band, and properties related to mixing (fluctuations and trajectories of neighboring grains). We find that vibrations induce more rearrangements of the grains and cause the pile of grains to become more compact over time. At constant peak acceleration we find that low frequency/high amplitude caused more grain movement than high frequency/low amplitude in both the stationary and rotating case.

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