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Thickness dependence of sheared granular layers on velocity profiles and effective friction ARSHAD KUDROLLI, ASHISH ORPE, SALOOME SIAVOSHI[1], Department of Physics, Clark University, Worcester, MA — We investigate the effective friction encountered by a mass sliding on a granular layer as a function of bed thickness and boundary roughness conditions. A rectangular slider of size 100 mm $\times$ 140 mm is pushed over a granular layer composed of 1 mm glass beads with a linear translating stage connected to a stepper motor. The friction is measured in the continuous sliding regime with the help of a spring and a displacement sensor. The observed friction has minima for a small number of layers before it increases and saturates to a value which depends on surface roughness. We use an index-matched interstitial liquid to probe the internal motion of the grains with fluorescence imaging in a regime where the liquid has no measurable effect on the friction. The shear profiles obtained as a function of depth show decrease in slip near the sliding surface as the layer thickness is increased. The gap between slider surface and the grains in the bed decreases on an average with layer thickness. From these measurements, we propose that the change in the friction with layer thickness is because of the increased confinement and locking of a grain relative to its neighbors.

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