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Surface Mobility of Horizontally Vibrated Granular Layers as a Function of Depth[1] CONOR PULS, JERRY GOLLUB, Haverford College, JIM MCELWAINE, Cambridge University — Stimulated by studies of avalanches where the critical slope angle is a function of layer depth [1], we investigate horizontally vibrated layers of various thickness, using acceleration to simulate the effects of gravity. The rectangular cell is 20 cm long in the direction of motion, and 8 cm transverse to that direction, containing polydisperse polystyrene particles of diameter 0.7-1.2 mm, 1-20 particles deep. We measure the RMS velocity of the mobilized surface particles in the frame of reference of the oscillating box, as a function of non-dimensional acceleration and layer depth. We find a depth-dependent threshold acceleration for surface mobility. The mobility also varies with time, due possibly to structural re-arrangement of the particles. The observations are compared to numerical simulations of the same phenomena using soft particle forces with friction, and to earlier experimental studies [2].

[1] O. Pouliquen, Phys. Fluids 11, 542 (1999).
[2] G. Metcalfe et al., Phys. Rev. E 61, 031302 (2002).

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