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Boundary effects on the stability of thin submerged granular piles S.B. OGALE, R.N. BATHE, R.J. CHOUDHARY, S.N. KALE[1], ABHIJIT S. OGALE, Sanshodhan Foundation, 128/1B, plot 3A, Shramik Sahakari Society, Kothrud, Pune 411 038, India, A.G. BANPURKAR, A.V. LIMAYE, Department of Physics, University of Pune, Pune 411 007, India — The stability of a pile of steel balls formed in a thin cell is studied for different liquids and air. The dependence of the angle of repose (AOR) on the medium and the cell thickness is examined. The AOR is observed to increase considerably with a decrease in cell width. In a thin cell (width comparable to a few times the ball diameter) the AOR is seen to depend on liquid viscosity, in contrast to the case of thick cells. A Voronoi polygon analysis of ball position correlations is made to enumerate the near-neighbor distributions as a function of AOR. The viscosity dependence in thin cells is attributed to the boundary wall effects, presumably caused by the influence of viscosity on granular arching. Interestingly, the AOR is found to be smaller in a thinnest cell with the cell width comparable to the bead diameter possibly due to absence of arching. The case of a pile formed in a thin cell in air stands out to be distinctly different as compared to the piles formed in liquids. Various issues such as the surface roughness of the balls, possible air trapping in micro-cavities and related formation of liquid bridges, effects of energy of impact on pile equilibrium etc. are addressed in the analysis.

[1]also at Fergusson College, Pune

Satishchandra Ogale
Center for Superconductivity Research, Department of Physics,
University of Maryland, College Park, MD 20742-4111

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