Abstract Submitted
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Capillary-like Fluctuations of a Solid-Liquid Interface in a Non-Cohesive Granular System[1] NICOLAS MUJICA, LI-HUA LUU, GUSTAVO CASTILLO, RODRIGO SOTO, Departamento de Fisica, FCFM, Universidad de Chile — One of the most noticeable collective motion of non-cohesive granular matter is clustering under certain conditions. In particular, when a quasi-two-dimensional monolayer of mono-disperse non-cohesive particles is vertically vibrated, a solid-liquid-like transition occurs when the driving amplitude exceeds a critical value. Here, the physical mechanism underlying particle clustering relies on the strong interactions mediated by grain collisions, rather than on grain-grain cohesive forces. In average, the solid cluster resembles a drop, with a striking circular shape. We experimentally investigate the coarse-grained solid-liquid interface fluctuations, which are characterized through the static and dynamic correlation functions in the Fourier space. These fluctuations turn out to be well described by the capillary wave theory, which allows us to measure the solid-liquid interface surface tension and mobility once the granular thermal kinetic energy is determined. Despite the system is strongly out of equilibrium and that the granular temperature is not uniform, there is energy equipartition at the solid-liquid interface, for a relatively large range of angular wave-numbers. Furthermore, both surface tension and mobility are consistent with a simple order of magnitude estimation.

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