Macroscopically identical granular systems with different number of particles.

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One defining property of granular materials is their low number of constituents when compared to molecular systems. This implies that (statistical) fluctuations can have a dominant effect on the global dynamics of the system. In the following we present a method to create identical time-averaged macroscopic states with significantly different numbers of particles in order to directly study the role of fluctuations in granular systems. We show the dependency of the hydrodynamic conservation equations on the particles' size, which directly relates to the total number of particles. Provided that the particles' dissipation is properly scaled, equivalent states can be obtained in the small particle size limit with differences of orders of magnitude in the number of particles. Simulations of the granular Leidenfrost state confirm the validity of the scalings, and allow us to study the effects of fluctuations on collective oscillations.