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Energy fluctuation, diffusivity and mobility in a 2D vibrated granular packing¹ ERIC CLEMENT, RIM HARICH, ESPCI -Université Paris 6, NICOLAS VANDEWALLE, GEOFFROY LUMAY, GRASP-Université Liège — We present an experimental realization of a 2D vibrated granular packing. The new agitation method allows a spatially non synchronized influx of energy and the study of the vibrated packing at steady state. By image analysis of fast-camera movies, we obtain the velocity fluctuation spectra at different vertical levels and then, we separate the agitation velocities from the velocity fluctuations corresponding to the “thermalized” degrees of freedom. By measuring the corresponding particle diffusivities, we show that, in spite a large heterogeneity and anisotropy of the vibration, a relation between diffusivity and “thermalized” kinetic energy can be identified. We relate this type of fluctuation-dissipation relation to the mobility of macroscopic intruders of different sizes and weight moving in the vibrated granular packing.

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