18th MSS-Seminar
Wednesday, August 17th, 15:30, Nägelsbachstr. 49b

Tapped Density Relaxation
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Solids Fraction Evolution and Microstructure

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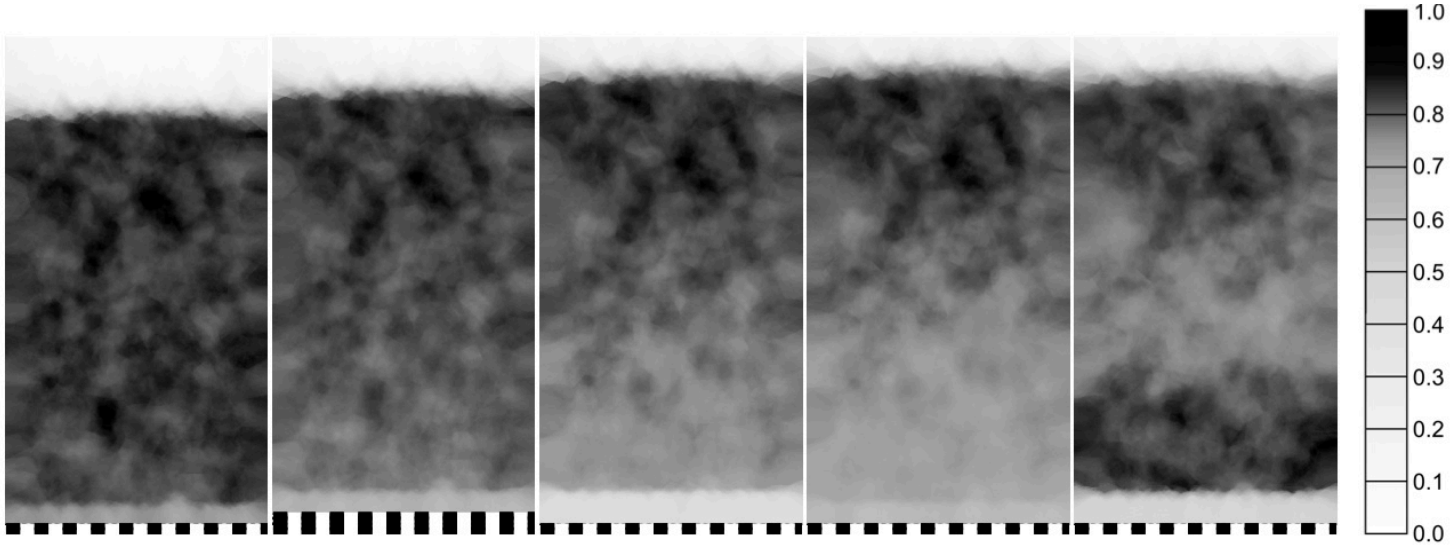

Density relaxation refers to the phenomenon in which granular solids experience an increase in bulk density due to the application of external, time-dependent forces. To model this process, discrete element simulations are carried out using dissipative soft-sphere spheres housed within a laterally periodic box. Tapping is achieved by prescribing a half sine wave impulse to the floor followed by a relaxation interval to allow the system to come to rest. The solids fraction evolves non-monotonically with floor acceleration Γ – reaching ~95% of the HCP theoretical maximum - with a gradual reduction to a loose packing as Γ increases beyond the peak point. The evolution to high bulk density is accompanied by the appearance of an order within the micro-structure. Animations of the simulation data reveal the propagation of a wave initiated from the floor that causes local rearrangements of the particles, which ultimately leading to the development of a dense packing after many hundreds of taps.