

FLOW STRUCTURES OF GRANULAR MATERIALS

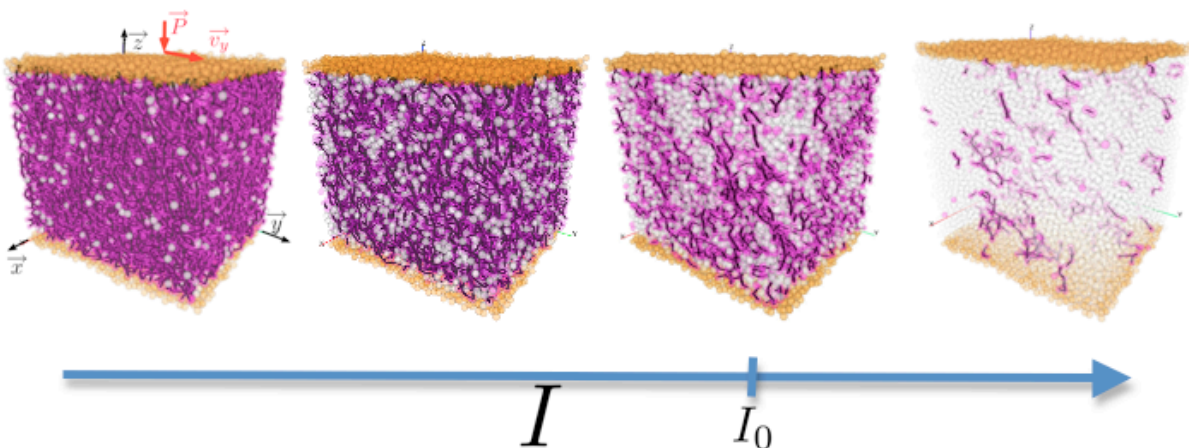
Emilien Azéma and Farhang Radjai

LMGC, Université Montpellier 2, CNRS,

Place Eugène Bataillon, 34095 Montpellier cedex 05, France

Emilien.azema@univ-montp2.fr and franck.radjai@univ-montp2.fr

By means of three-dimensional Contact Dynamics (CD) simulations, we investigate the microstructural properties of sheared granular packings by varying systematically the inertial number I from the quasi-static regime, to the intermediate dense flow and collisional regime [1]. A detailed analysis of the connectivity of the particles reveals that the transition between the regimes is correlated to profound changes of the nature of the contact network. In particular, we show that the increase of friction angle with inertial number is only a consequence of contact anisotropy. As the inertial number increases, the role of force chains decrease and that of friction mobilization increases as long as percolating force chains are present in the system. Beyond this point, which corresponds to an inertial number $I_0 \sim 0.25$, the force anisotropies do not evolve with the inertial number. Finally, a detailed analysis of the spatial correlations of floating particles, i.e., particles without bearing contacts, reveals the occurrence of "fluidized" volumes in the dense flow regime which increase in size and percolate precisely at I_0 as illustrated in the following figures.



References

[1] Gdr Midi, (2004), On dense granular flows, Eur. Phys. J. E, 341-365.