

## ACOUSTICS2008/815 Sound waves in 3D periodic granular materials

Orion Mouraille and Stefan Luding

UTwente, Multi Scale Mechanics, P.O.Box 217, 7500 AE Enschede, Netherlands

The sound propagation mechanisms inside dense granular matter, even for periodical structures, are challenging the attempts to describe it because of the discrete nature of the material. Phenomena like dissipation, scattering, and dispersion are hard to predict based on the material state and/or properties and vice-versa. We propose here a simulation method using dynamic discrete elements in order to get more insight in this problem. The small perturbation created on one side of a dense, static regular packing of grains is examined during its propagation and when it arrives at the opposite side. Both longitudinal and shear perturbation are studied and an interesting wave-acceleration is observed [1]. Moreover the rotational degree of freedom permits to observe the role of rotations in the wave propagation. The control of the inter-particle forces like, contact potential, cohesion and friction make possible to observe the effect of these micro-parameters on the macro-behavior (at the wave scale). Long term goal is to predict the large-scale macroscopic material behavior from the microscopic structure and material parameters.

[1] O. Mouraille, W A Mulder and S. Luding: Sound wave acceleration in granular materials, *J. Stat. Mech.* (2006) P07023.