Modeling of granular compaction under confinement with DEM

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ABSTRACT

Modeling confined powder compaction with the DEM is a really advanced task as a result of the classical particle-particle contact models that are limited on the assumption of contact independence regardless the degree of the confinement. A fact, that at least, at high relative densities seized to be valid, for the reason that each particle experiences multiple simultaneous contacts. Important progress has been made recently, resulting in the formulation of multi contact DEM[1] but it is limited to elastic deformation of particles.

In this paper, a new force model tackling this issue is being presenting, by adding an extra term in force and displacement formula which is a function of Poisson ratio and stress tensor we are able to capture the deformation of the particle. Hence, and for first time, stress tensor commonly used for post processing reasons (i.e cross coarse-graining method) was used to account for multiple contacts acting on a single particle.

In this initial attempt, uniaxial compression simulations for hertz and linear contact model where conducted and we emphasized our efforts to elastic spheres without friction and gravitational forces. Our results have proved that are new force model is capable of capturing extra force that was missing before with classic simulations using the non-deformable spheres. Comparison with classic DEM simulations along with alternative model for interactions between multiple contacts are presented.

REFERENCES

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