Behavior of highly deformable particle systems subjected to uni-axial compression

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Abstract

Granular materials composed of soft particles which can undergo large deformations are ubiquitous in pharmaceutical, food, cosmetic industries as well as in biological systems. The large deformations of the particles strongly affect the mechanical behavior of the system compared to hard particle granular materials which are more often considered in research on granular materials.

In this work, we investigated and analyzed the rheological behavior of a model system of deformable neo-hookean particles subjected to uniaxial compressions by means of numerical approaches. The effect of both friction and bulk modulus of the particules on the mechanical properties of the systems are clarified, including systems with packing fractions close to 100%.

The simulation relies on coupling the Finite Element Method and the Contact Dynamic Method, taking into account the high deformability of particles and interactions between them using the software LMGC90 [1].

References

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