

## Coarse-grained CFD-DEM simulations of shaker-belt drying

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Many granular materials need to be dried before further processing [Golshan et al. \(2020\)](#). A commonly used drying equipment in industry is a shaker-belt that is aerated from below. This aeration is below the critical fluidization velocity, but the combined oscillatory motion and gas flow loosens up the material making effective drying possible. To get more insight in this process a CFD-DEM methodology is developed to simulate the combined hydrodynamics, heat and mass transfer.

The particle count in an industrial process is huge, consequently an excessive calculation time for CFD-DEM simulations is required. In order to overcome this limitation, a coarse-grained representation of granular material is required for simulating such processes. As illustrated in Figure 1, a set of particles is represented by a coarse-grain particle. Via this methodology, the CFD-DEM technique can still be applied, which is beneficial in terms of accuracy compared to two-fluid (TFM) or phenomenological models. In this talk different coarse-graining methodologies, [Mu et al. \(2020\)](#); [Sakai et al. \(2014\)](#), are compared and discussed. Here, we focus on the hydrodynamics of the coarse-grained granular material. Results are presented for a fluidized bed model system. First results on aerated and shaken granular material will also be shown. Conclusions on the suitability of coarse-graining methodologies are provided.

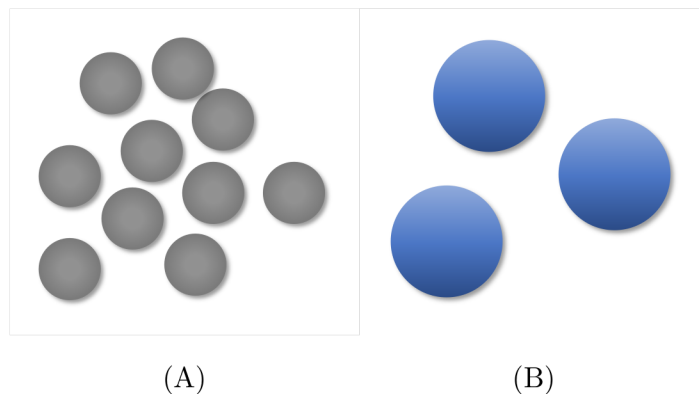


Figure 1: (A) Original particle representation. (B) Coarse-grained particle representation.

## References

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