

Coupling with meshfree Lagrangean method

What is DEM?

- DEM (Discrete Element Method) is a kind of a particle-based method to track individual calculation points, classified as a meshfree Lagrangian method in terms of solution method.
- Captures the behavior of individual particles difficult to predict enough by FVM (finite volume method) which requires mesh generation.
- Suitable for modeling phenomena including particle accumulation, filter choking, and heat transfer between particles since it involves identifying the contact force between particles.
- Strong coupling analysis of DEM-FVM available in both scSTREAM and scELOW.

Screw Conveyor

Calculates the agitation and transportation of particles with a combinational use of Moving Objects. Particles are conveyed by the rotation of a helical screw.

Particles





HEXAGON Oradle

Temperature [°C]



Fluidized bed

Washing Machine

Builds a DEM-Facbric Model which moves while maintaining two-dimensional connection like a cloth by defining the binding force between particles.



high-temperature particles conveyed by an equipment at ambient temperature. Considers **heat transfer** between particles and particle/solid.

TEMPERATURE Heat exchange Particles between particle/solid Temperature of particles found decreasing and the screw increasing. Time : 5.260

Binding force between same colored particles

An example using 5 pieces of fabric model. Particles are two-dimensionally aligned and the interparticle binding force is applied in the planar direction.

Analysis of cloth and fluid rotating in a horizontal drum. The gas-liquid interface is calculated by VOF (Volume of Fluid) Function, and the cloth is represented by a DEM-Fabric Model.



A complex phenomena involving three phases flow (liquid-gas-cloth) can be analyzed.

Notes

Time : 1.750

- Strong coupling of DEM-FVM solution delivered by scSTREAM and scFLOW shows its capability to accurately capture the behavior of the interaction between flow and particles to fit to the user's area of focus.
- DEM can be used in combination with moving elements (Moving object), heat transfer and free surface all of which are standard features applicable to a wide range of engineering projects. The use of Scripts (User-defined functions) will further expand the applications field.