STUDY OF SEGREGATION OF NON-SPHERICAL PARTICLES USING DEM IN A VIBRATING PACKED BED

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PROJECT OUTLINE

1. **Introduction**
   Our Project, Problem Statement

2. **Models**
   Granular Contact Models

3. **Features and Coding Concepts**
   Liggghts, MPI, Discrete Element Method (DEM)

INTRODUCTION (PROJECT OVERVIEW)

- Simulate Vibrating Packed Bed Filled with non-spherical particles.
- Analyze the segregation of mixture in the bed.
- Use Discrete Element Method (DEM)

MODELS (GRANULAR CONTACT MODELS)

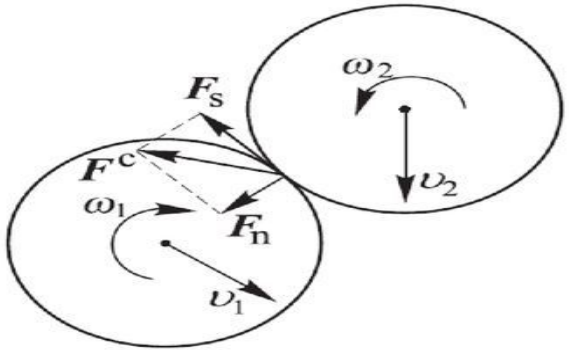
Contact model

Decomposition of the contact force

$$\boldsymbol{F}_{ij}^{c} = (\boldsymbol{F}_{\mathrm{n}})_{ij} + (\boldsymbol{F}_{\mathrm{s}})_{ij} = (F_{\mathrm{n}})_{ij}\boldsymbol{n}_j + (\boldsymbol{F}_{\mathrm{s}})_{ij}$$

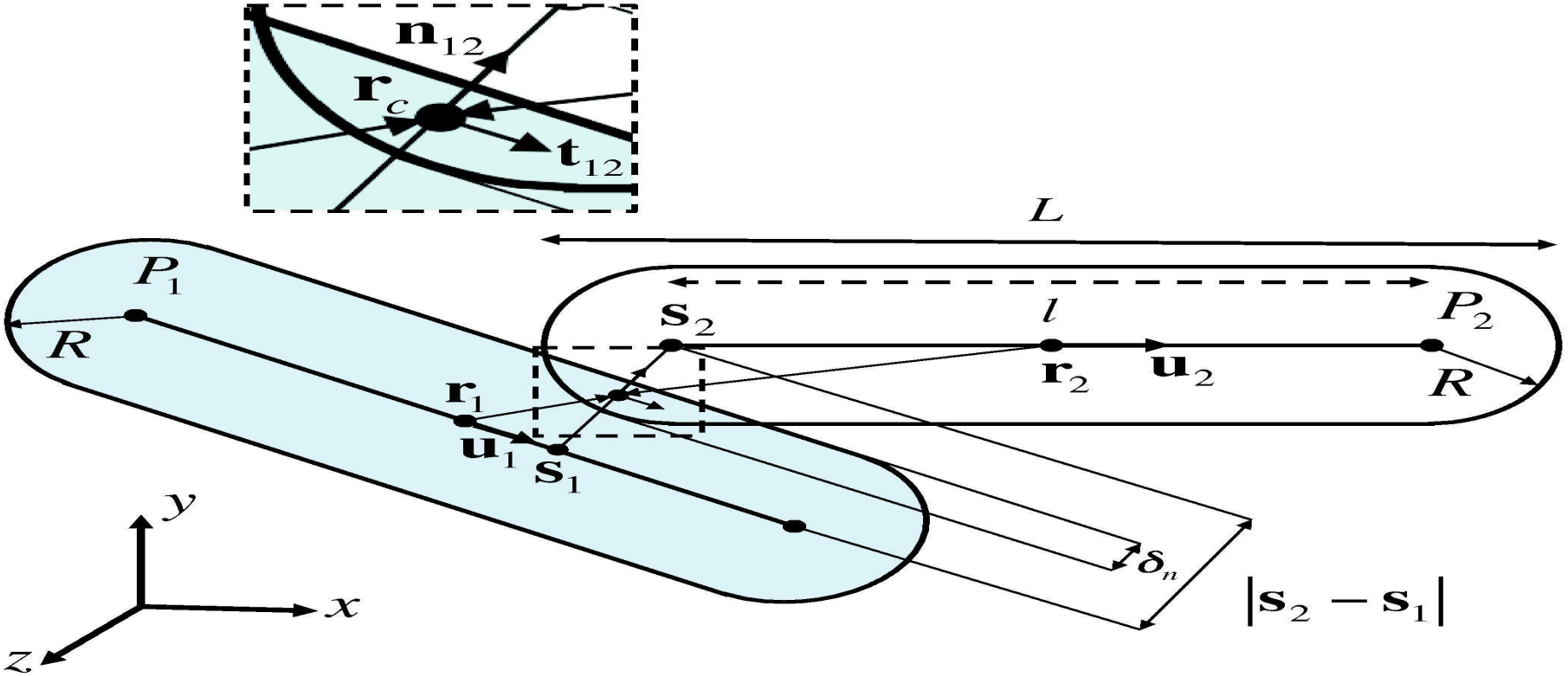
$\boldsymbol{F}_{\mathrm{n}}$ – normal contact force

$\boldsymbol{F}_{\mathrm{s}}$ – tangential contact force



Pair of interacting particles

LIGGGHTS MODEL



LIGGGHTS (OVERVIEW)

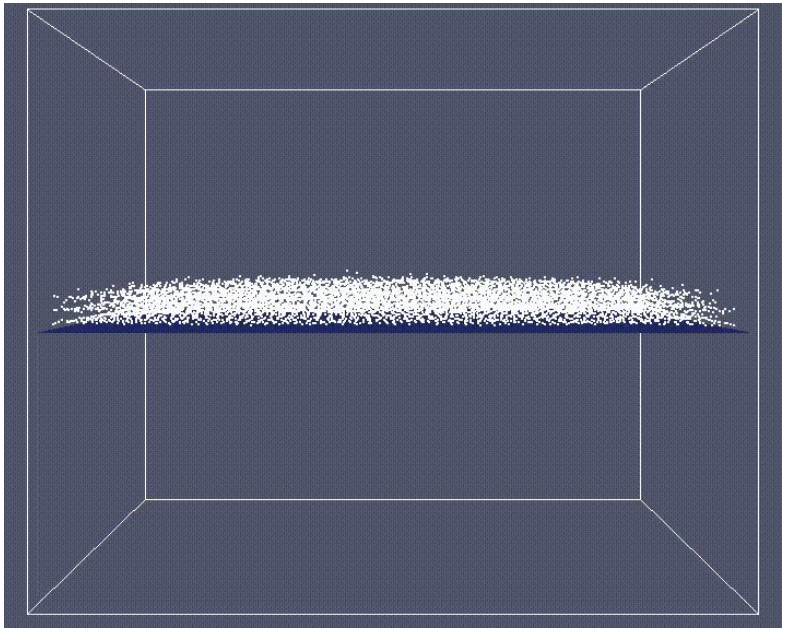
LAMMPS IMPROVED FOR GENERAL GRANULAR AND GRANULAR HEAT TRANSFER SIMULATIONS

LIGGGHTS = An Open Source, C++, MPI parallel DEM code

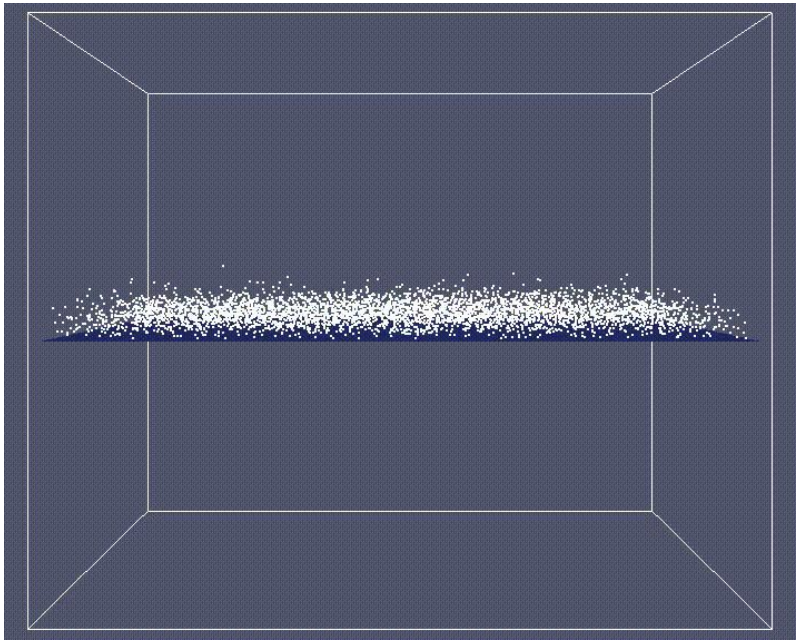
SIMULATION OF VIBRATING BED

- Create a mesh or define a boundary (Declare domain)
- Initialize the material and its properties
- Insert particles
- Define the physics or contact models
- Define the timestep

PROTOTYPE OF VIBRATING PACKED BED



(15 Hz)



(30 Hz)

FUTURE GOALS

- Do a quantitative analyses of segregation of the mixture of non-spherical particles
- Compare the simulation results with experimental for modelling the mixture.

THANK YOU