Master thesis
Particle Flow Simulation

Time Discretization of Particle Flow Simulations with a higher-order Discontinous Galerkin Method

Mechanical engineering / Computational Engineering

Start: Immediately

TECHNISCHE UNIVERSITÄT DARMSTADT

Particulate flows are of high scientific and technological interest with lots of applications. The understanding of such flows is important in chemical engineering (separation), life science (blood flow) and basic understanding of nature (sedimentation in ocean or river beds). There is still a lack of accurate and efficient solvers. Even with the computer power nowadays on big research and industry clusters the efficiency of a solver is still crucial especially for industrial applications.

Source: http://bit.ly/1TzliCm

Methods for particulate flows can be separated in two general approaches: The first one is the so called Lagrangian approach which uses a mesh fitted to the surfaces of the particles for imposing the boundary conditions. The second group are immersed boundary methods.

In immersed boundary methods all calculations are done on a fixed Cartesian grid. It is not needed to remesh in every timestep in order to be conform with the geometry. Therefore the key of this method is, to impose the presence of the particle on the flow without remeshing.

Individual tasks

- Familiarization with the current immersed boundary solver based on the BoSSS framework
- Literature research on time discretization methods for moving domains
- Developement and calculation of testcases for time discretization
- Simulation of coupling testcases based on the results obtained

Required qualifications

- Basic knowledge in numerical methods for ODEs/PDEs and programming

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