

WORKGROUP FOR MULTIPHAS FLOWS

Lattice Boltzmann approach

The program LBsim3D (Lattice-Boltzmann simulation 3D) is based on the Lattice-Boltzmann method and is used for direct numerical simulation of disperse fluid-solid flows in electric and thermic fields.

Features and implemented models:

1. flow solver:

- Structured equidistant and non-equidistant 3D grids
- Discretisation with the D3Q19 model
- ▶ Single-Relaxation-Time collision operator based on BGK approach
- Laminar and turbulent flows (spectral stimulation of isotropic homogenous turbulence)

2. Handling of numerically highly resolved particle surfaces:

- Curved Boundaries for complex morphologies
- Generation and characterization of agglomerates
- Determination of forces and flow coefficients of arbitrary particles
- Lagrangian particle tracking (translation and rotation)

3. Lagrangian tracking of point particles:

- Stationary and instationary particle tracking
- Considered Forces acting on particle: drag, gravitation, lift, pressure gradient, virtual mass, Basset, Saffman, Magnus, Brownian motion Bewegung, electric field
- ► Particle rotation
- Different injection methods
- ► Deterministic particle-particle collision model
- ► Deterministic particle-wall deposition model

4. Solver for the temperature field:

- Hybrid Temperature-Lattice-Boltzmann method
- Stationary and instationary coupling

5. Solver for electric fields:

► Solution oft he Laplace equation