WORKGROUP FOR
MULTIPHAS FLOWS

Euler/Lagrange approach

OpenFOAM®

OpenFOAM (Open-source Field Operation And Manipulation) is a › C++ (https://en.wikipedia.org/wiki/C%2B%2B) open source software for the development of computational fluid dynamics (CFD) and continuum mechanics customized numerical solvers. it can handle several applications in the multiphase flows field.

- Particle tracking.
- Reacting multiphase models for heat transfer, population balance, breakup, coalescence, etc.
- Heat transfer.
- Reactions/combustion.
- Turbulence.
- Mesh interfaces.

In the Multiphase flow working group (MPS – IVT) different codes has been developed for the particle tracking using Euler/Lagrange approach, including:

- Stochastic particle-particle collision model.
- particle-wall-collisions.
- Agglomeration / Deposition.
- Mass transfer.
- Evaporation.
- Different dispersion models (isotropic, anisotropic).
- Different injection methods.
- Different particle/bubble forces: Drag, Saffman force, Magnus force, virtual mass, Brownian motion, thermophoresis, bubble l force, wall force, Basset history force.
- Adapted Lagrangian time step
- Source term distribution.

Fastest3D

The flow solver FASTEST (Flow Analysis Solving Transport Equations with Simulated Turbulence) is an efficient program to calculate flows in complex threedimensional applications.

Further information: › Fastest Website (http://www.fnb.tu-darmstadt.de/forschung_fnb/software_fnb/software_fnb.de.jsp)

Lag3D

Lag3D (Lagrangian 3D) is a program for simulating disperse phases in a continuous medium, that can be used together with Fastest3D. In doing so the particles trajectories are determined with the flow field via a Lagrange approach.

Features and implemented models

- Calculation of volume averaged phase properties
- Particle-wall-collissions
- Stochastic particle-particle collission model
- Agglomeration / coalescense
- Vaporization
- Laminar / turbulent tracking
  Different dispersion models (isotropic, anisotropic)
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- Quasi-instationary tracking
- Particle rotation
- Different injection geometries
- 2/4 Way-coupling with flow solver
- Implemented particle forces: drag, Saffman force, magnus force, virtual mass, Brownian motion, thermophoresis
- Consideration of Cunningham correcture

The code is available for scientific purposes.

Contact: › Prof. Dr.-Ing. Martin Sommerfeld (mailto:martin.sommerfeld@iw.uni-halle.de)