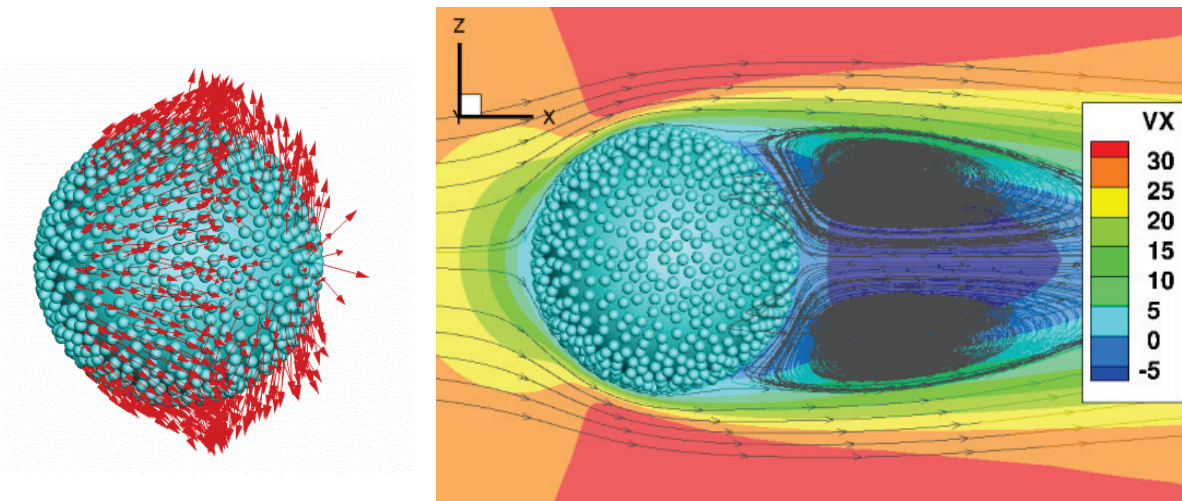


Programme of the
14th WORKSHOP
ON TWO-PHASE FLOW PREDICTIONS

07. – 10. September 2015



Zentrum für Ingenieurwissenschaften
Martin-Luther-Universität Halle-Wittenberg
D-06099 Halle (Saale), Germany



Lattice-Boltzmann Simulations: Flow about a particle coated with 882 drug particles at $Re = 200$, study related to drug particle detachment in an inhaler.

The Workshop is co-sponsored by:

ERCOFTAC (European Research Community on Flow, Turbulence and Combustion)

General Introduction

The series of Workshops started in 1984 at the Institute of Fluid Mechanics of the University of Erlangen/Nürnberg. The participation was limited to only a few research groups working in the field of particle dispersion in turbulent flows. An important objective was the performance and discussion of numerical calculations for pre-defined test cases. During the past 30 years numerical calculations of dispersed multiphase flows have received considerable interest in research and technical or industrial applications. For numerous companies in the process industries (e.g. chemical industry or food industry) computational fluid dynamics (CFD) for multiphase flow has become an important tool for process analysis, optimisation and design. Essential for reliable numerical calculations is the modelling of the underlying elementary processes, occurring on the scale of the particle, such as particle transport in turbulence, particle-wall collisions, inter-particle collisions, agglomeration, droplet/bubble collisions and coalescence as well as heat and mass transfer. This area is still in the stage of development. Important for model developments are theoretical analysis, direct numerical simulations and detailed experiments. Hence, multiphase-flow calculations generally require multi-scale approaches.

Content of the Workshop

The main objective of the Workshop is to bring together researchers working in the field of dispersed multiphase flow on a theoretical, numerical or experimental basis. Oral presentations in the following areas are presented:

1. Modelling of dispersed turbulent two-phase flows (turbulence models, heat and mass transfer, particle-wall interaction, particle-particle interaction, bubble and droplet interactions, agglomeration, ...) in the frame of the Euler/Euler- or Euler/Lagrange-approach
2. Direct numerical simulations of fully resolved particles (solid particles, droplets and bubbles)
3. Direct and large eddy simulations of particulate flows (point-particle approach)
4. Application of numerical methods for two-phase flows in process engineering
5. Experimental studies on dispersed two-phase flows including new measurement techniques

Test Case Calculations

An additional objective of the Workshop will be related to the validation of numerical predictions obtained by different model approaches and numerical codes. These validations will be based on pre-defined test cases for which experimental or numerical results (e.g. direct or large eddy simulations) are available. Two test cases were selected and made available to interested groups prior to the Workshop on the homepage of the organisers (http://www-mvt.iw.uni-halle.de/events/14th_workshop_two-phase_flows/testcases/). The test cases are generally blind test cases and only boundary and inlet conditions were provided. The following test cases are considered for the present Workshop:

- Dense particle-laden free jet with different solids loading (Prof. J. Sinclair-Curtis)
- Dispersion of rod-like particles in a free jet, ejected from a narrow pipe (G. P. Romano, Roma; Prof. C. Marchioli)

As a consequence of the recent developments it would be very interesting to compare besides Euler/Euler- and Euler/Lagrange-method also RANS and LES approaches.

During the Workshop, the numerical results for the test cases will be exhibited in a poster session. The test case calculations can be regarded as a challenge to approach more complex problems in two-phase flow predictions and will hopefully stimulate further improvements and developments of numerical methods and models. After the Workshop the test case results will be displayed at the homepage of the Workshop and it is planned to prepare also joint publications.

Location of the Workshop

The Workshop is organised by the Centre of Engineering Science at the Martin-Luther-University Halle-Wittenberg. The location of the Workshop is Campus Heide in Halle/Saale, Theodor-Lieser-Straße 9, D-06120 Halle (Saale), (building 50 on the map below). The lectures will be given in the **lecture hall no. E.02**.

Location of the Institute “Mechanical Process Engineering”

Mechanische Verfahrenstechnik
Zeppelinstraße 1

D-06130 Halle (Saale)

Arrival Information

By plane: The airport Leipzig-Halle is located about 40 km from Halle. Trains to Halle leave hourly and take about 15 minutes. From the station take a tram or taxi to your hotel.

By train: Halle Central Station can be reached by high-speed train from Frankfurt, Dresden, Nürnberg and Berlin. From the station take a tram or taxi to your hotel.

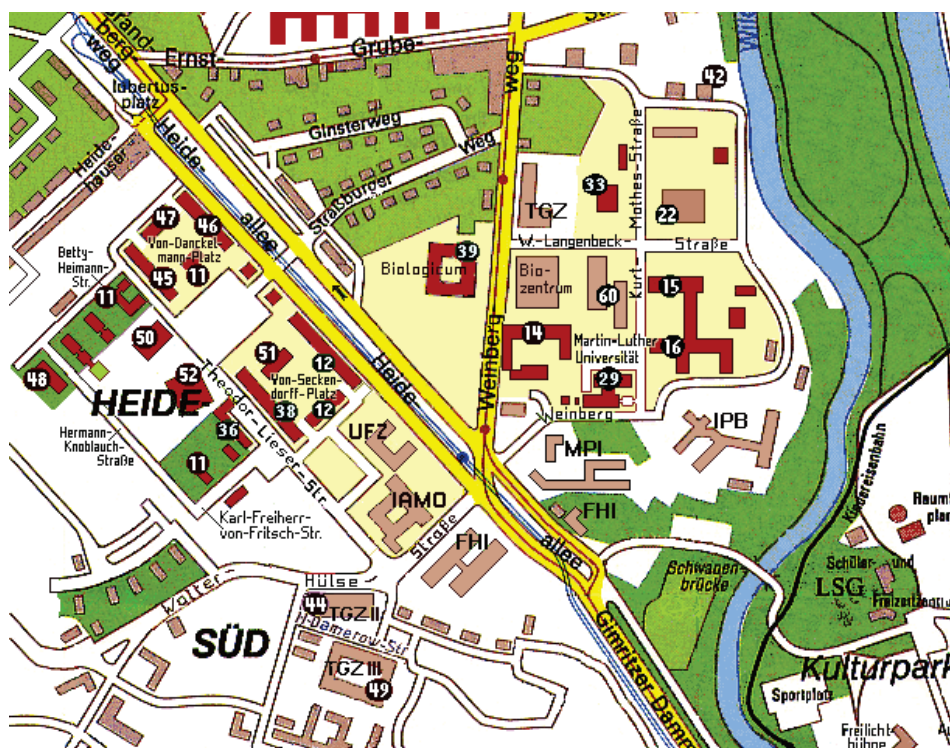
By car: Leave the motorway A14 at exit Halle-Trotha, and drive at the B6 direction Halle.

Travel to the Meeting Site

From Central Station take the tram number 4 or 5, direction Kröllwitz. You reach the campus in 10 – 15 minutes. Please leave the tram at tram stop Straßburger Weg.

From the city centre take the tram number 5, direction Kröllwitz, tram stop Markt or Hallmarkt. You reach the campus in 7 – 8 minutes. Please leave the tram at tram stop Straßburger Weg.

Map of the Campus Heide in Halle:



Legend:

- 50 Location of the Workshop
- 52 Students restaurant (Mensa) for Lunch

Monday, September 07, 2015

- 8:30 hrs Registration
- 9:15 hrs Sommerfeld, M.
Welcome, Introduction
- 9:30 hrs Sommerfeld, M.
Introduction to dense particle-laden free jet
- 9:45 hrs Marchioli, C.
Dispersion of rod-like particles in a turbulent free jet
- 10:00 – 10:30 hrs Coffee break*

Direct numerical simulations with interface resolution

- 10:30 hrs Derksen, J. (keynote lecture)
Simulations of dispersed multiphase flow at the particle level
- 11:30 hrs Eshghinejadfard, A., Abdelsamie, A. and Thévenin, D.
Lattice-Boltzmann vs. Navier-Stokes simulation of particulate flows
- 12:00 hrs Badillo, A.
Phase-field simulations of liquid interfaces in contact with solids
- 12:30 - 13:30 hrs Lunch*
- 13:30 hrs Borrmann, S. and Schwarze, R.
Fluid-Solid-Interaction Simulations with the WCSPH Method in the Software Package Yade
- 14:00 hrs Albert, Ch., Kromer, J., Robertson A.M. und Bothe, D.
Dynamic behavior of buoyant high viscosity droplets rising in a quiescent liquid
- 14:30 hrs Finotello, G., Deen, N.G., Padding, J.T., Jongsma, A., Innings, F. and Kuipers J.A.M.
Study of the effect of viscosity on binary droplet collisions

15:00 hrs Münster, R., Mierka, O. and Turek, S.
Particulate Flow Simulations with Complex Geometries using the Finite Element-Fictitious Boundary Method

15:30 – 16:00 hrs *Coffee break*

Experimental studies

16:00 hrs Ostmann, S., Chaves H. and Brücker, Ch.
Qualitative study on path instabilities of light particles rising within a liquid at rotation

16:30 hrs Freudigmann, H.A. and Iben, U.
Optische Untersuchung der Luftausgasung im Nachlauf einer Drosselströmung

17:00 hrs Pasternak, L. und Sommerfeld, M.
Experimental studies on fiber-laden cross-jet by a pulsed LED-PIV System

Tuesday, September 08, 2015

Direct and large eddy simulations of particulate flow

9:00 hrs Stylianou, F.S. Koullapis P.G. and Kassinis S.C.
(keynote lecture)
Direct and Large-Eddy Simulations of Aerosol Transport in Human Airways

10:00 hrs Redlinger-Pohn, J.D. and Radl, S.
Separation Effects and Orientation Statistics of Fibres in Coiled-Pipe Suspension Flow

10:30 – 11:00 hrs *Coffee break*

11:00 hrs Zhao, L., Reddy Challabotla, N. and Andersson, H.I.
DNS of spheroidal particles in wall turbulence

11:30 hrs Lovecchio, S., Marchioli, C. and Soldati A.
Micro-swimmer dynamics in free-surface turbulence subject to wind stress

12:00 hrs Marchioli, C. and Soldati, A.
Turbulent breakage of ductile aggregates

12:30 - 13:15 hrs	<i>Lunch</i>
13:30 hrs	Start of Excursion by bus
15:00 – 17:00 hrs	Visit of Glatt Research Center Weimar
17:30 – 19:00 hrs	Guided city tour in Weimar Center
from 19:00 hrs	Banquet: Köstritzer Schwarzbier Haus
21:30 – 22:00 hrs	Return to Halle

Wednesday, September 09, 2015

Modelling of dispersed turbulent two-phase flows

9:00 hrs	Reeks, M.W. The notion of particle pressure in a suspension of particles in turbulent flow
9:30 hrs	Achury, J. and Polifke, W. Theoretical and numerical investigation of particle response to an axial acoustic field
10:00 hrs	Jin, C., Potts, I. and Reeks, M.W. A simple stochastic quadrant model for the turbulent deposition of particles in turbulent boundary layers
10:30 – 11:00 hrs	<i>Coffee break</i>
11:00 hrs	Hu, Y., Olguin, H. and Gutheil, E. Transported joint PDF modeling of reacting dilute sprays combined with a spray flamelet/progress variable approach
11:30 hrs	Arcen, B. and Tanière, A. A stochastic model for the prediction of particle/particle interactions in the frame of the Euler-Lagrange approach
12:00 hrs	Sander, S. and Fritsching, U. Modeling of the influence of coupling between electric ion charges and hydrodynamic flow on particle charging and acceleration in electrostatic fields using OpenFOAM

12:30 – 13:30 hrs Lunch

13:30 hrs Wollborn, T., Knoop, C. and Fritsching, U.
The effect of an oscillating agitated fluid on particle agglomerates and analysis of bond breakage

14:00 hrs Quintero, B., Lain, S. and Sommerfeld, M.
Numerical simulation of elongated fibres in horizontal channel flow

14:30 hrs Almohammed, N. and Breuer, M.
Comparison of an energy-based and a momentum-based agglomeration model within an Euler-Lagrange LES approach

15:00 – 15:30 hrs Coffee break

15:30 hrs Lain, S. and Sommerfeld, M.
Erosion prediction in a horizontal to vertical elbow by the Euler-Lagrange approach

16:00 hrs Neben, M., Egbers, Ch. and Wenzke, S.
3D-CFD-Simulations of the gas-particle flow in a cold gas Laval nozzle to predict the mechanical erosion

From 17:00 hrs Possibility of visiting the Institute Mechanical Process Engineering, particle technology and multiphase flows

Thursday, September 10, 2015

Application of numerical methods for two-phase flow

9:00 hrs Asad, A., Kratzsch, Ch. and Schwarze, R.
Application of the discrete phase model in metallurgical processes

9:30 hrs Rzehak, R. and Krepper E.
Euler-Euler Modeling of Mass-Transfer in Bubbly Flows

10:00 hrs Hoppe, F. and Breuer, M.
Large-eddy simulation of bubbly turbulent flows based on an Euler-Lagrange approach for a huge number of microbubbles

10:30 – 11:00 hrs Coffee break

11:00 hrs Schmalfuß, S. and Sommerfeld, M.
Numerical and experimental analysis of particle behaviour in Fluid Phase Resonance Mixers

11:30 hrs Aragall, R., Yu, F., Thurmann, M. and Brenner, B.
Transport of solid-liquid suspensions in wellbore drilling: multiscale modeling and experimental validation

12:00 hrs Judakova, G. and Bause, M.
Multiphase flow of natural gas through pipelines

12:30 – 13:30 hrs Lunch

13:30 hrs Krause, M.J. and Maier, M.-L.
OpenLB: An Open Source Library for Parallel Lattice Boltzmann Fluid Flow Simulations

14:00 hrs Misiulia, D., Andersson, A.G. and Lundström T. S.
Effects of the inlet angle on the flow field and performance of a cyclone separator with helical-roof inlet

14:30 hrs Le, H.D., Lacomme, J.-M., Vignes, A., Debray, B., Truchot, B., Fede P. and Climent E.
Modelling of test case particle-laden jet with Neptune_CFD

15:00 hrs Greifzu, F. and Schwarze, R.
Simulation of Disperse Particle-Laden Gas Flows with OpenFOAM and ANSYS FLUENT

15:30 – 16:00 hrs Coffee break

16:30 hrs End of Workshop, Conclusion

From 17:00 hrs Possibility of visiting the Institute Mechanical Process Engineering, particle technology and multiphase flows