Best Practice Guidance Seminar

CFD for Dispersed Multi-Phase Flows 2026

With Problem Shooting Session and Posters

12th to 14th October 2026

ERCOFTAC Pilot Centre Greece
National Technical University of Athens (NTUA)

Main lecturers:

- **Prof. Dr.-Ing. Martin Sommerfeld, Multiphase Flow Systems, Otto-von-Guericke University Magdeburg, Germany**
- **Prof. Dr. Olivier Simonin, Institut de Mécanique des Fluides de Toulouse (IMFT) Toulouse, France**
- **Dr.-Ing. Martin Wörner, Karlsruhe Institute of Technology (KIT), Karlsruhe, Germany**
- **Dr.-Ing. Manuel Taborda, Mechanical Process Engineering, Otto-von-Guericke University Magdeburg, Germany**

Local lecturer:

- **Prof. Foivos Koukouvinis, National Technical University of Athens (NTUA), Greece**

Local Organiser:

- **Prof. Demetri Bouris, National Technical University of Athens, Mechanical Engineering, Fluids Section, Greece**

Further Information: **http://www.ercoftac.org/** **and** **martin.Sommerfeld@ovgu.de**

Monday, 12th October 2026

8:30 Registration and welcome by Prof. Demetri Bouris, NTUA.

8:45 Introduction to the course; Characterisation of multiphase flows (45 min)
Martin Sommerfeld (OvGU)

9:30 Numerical methods for multi-phase flow: Common basis and differences (60 min)
Martin Wörner (KIT)

10:30 Refreshments (30 min)

11:00 Industrial challenges and needs for the application of CFD to industrial dispersed multiphase flows (60 min) Olivier Simonin (IMFT)

12:00 Lunch (60 min)

13:00 Forces on spherical particles and deformable bubbles (60 min)
Martin Sommerfeld (OvGU)

14:00 Point-particle Euler/Lagrange methods, fundamentals, implementation and coupling of fluid flow and discrete particle method (60 min) Martin Sommerfeld (OvGU)

15:00 Refreshments (30 min)

15:30 Multi-Fluid (N-Euler) approach for poly-dispersed dilute or dense particle-laden flows (60 min) Olivier Simonin (IMFT)

16:30 Eulerian multi-fluid model for gas-liquid flows: A universal and efficient approach (60 min)
Martin Wörner (KIT)

17:30 Q & A (30 min)

19:30 Joint dinner at a restaurant to be announced

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Tuesday, 13rd October 2026

8:30 CFD/DEM (Euler-Lagrange) approach for particle-laden flows with finite size particles (60 min) Olivier Simonin (IMFT)

9:30 Point-particle modelling of non-spherical particle transport in turbulent flows (60 min) Manuel A. Taborda (OvGU)

10:30 Refreshments (30 min)

11:00 Multiphase flows and thermodynamic effects: applications in sprays and bubble dynamics (60 min) Foivos Koukouvinis (NTUA)

12:00 Lunch (60 min)

13:00 Modelling elementary processes in dispersed multi-phase flows (60 min) (examples: Spray Droplets and Bubbles) Martin Sommerfeld (OvGU)

14:00 LES and coarse-grid simulation of particle-laden flows in the frame of Euler-Lagrange and Euler-Euler approaches (60 min) Olivier Simonin (IMFT)

15:00 Refreshments (30 min)

15:30 An old separation device and new findings: The Cyclone Separator (45 min) Martin Sommerfeld (OvGU)

16:15 Problem shooting session, short presentations from participants (60 min) (Registration required, please submit your proposal, we will try our best to help solving your problem) ALL

Delegates are offered the opportunity to present their work via 10 minutes presentations (problem-shooting session), thereafter, the lecturers together with the audience may offer prospective solutions.

Registration is required: martin.sommerfeld@ovgu.de.

Wednesday, 14th October 2026

8:30 **Resolved simulations of multi-fluid flows: Great insights at high costs (60 min)**
Martin Wörner (KIT)

9:30 **Dispersion of fibre-like particles in a jet in cross-flow configuration: Experiments and Simulations (60 min)** **Manuel A. Taborda (OvGU)**

10:30 **Refreshments (30 min)**

11:00 **What can we learn from point-particle Euler/Lagrange computations: Deposition in dry powder inhalers and erosion in a T-junction (60 min)** **Martin Sommerfeld (OvGU)**

12:00 **Lunch (60 min)**

14:00 **Summary of available test cases, channels, jets, sprays, fluidised beds (30 min)**
Martin Sommerfeld (OvGU)

14:30 **Closure**

Poster Session

During the entire BPG seminar all participants have the opportunity to display a poster about their ongoing research work. This shall enhance the exchange and discussion between the participants.

The posters should have the format A0 which is 900 mm x 1200 mm at maximum.

The participation at the poster session requires prior registration at:

***martin.sommerfeld@ovgu.de*.**

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Multiphase Flow Challenges

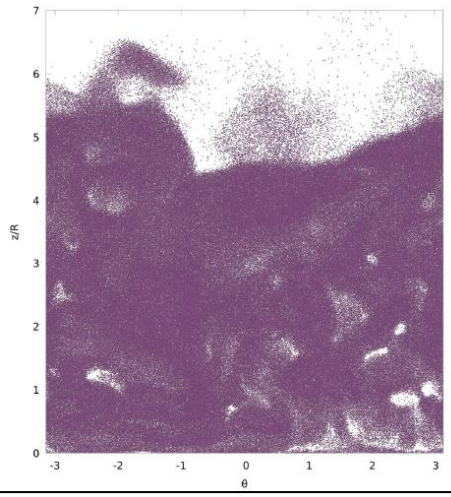
The simultaneous presence of several different phases in external or internal flows such as gas, liquid and solid is found in daily life, environment and numerous industrial processes. These types of flows are termed multiphase flows, which may exist in different forms depending on the phase distribution, such as separated and dispersed systems. Examples are gas-liquid transportation, crude oil recovery, circulating fluidized beds, sediment transport in rivers, pollutant transport in the environment and atmosphere, fine particle separation, cloud formation, fuel injection in engines, bubble column reactors and sprays for food processing, to name only a few. As a result of the interaction between the different phases such flows are rather complicated and very difficult to describe theoretically.

Consequently, the numerical calculation of multiphase flow systems based on CFD methods also comprises a multitude of different numerical methods each applicable to certain types of multiphase flows and resolving different length and time scales of the problem. The present course focusses on numerical simulations of dispersed multiphase flows and the required modelling of particle-scale phenomena. The hierarchy of available numerical techniques for the different scales in multiphase flows (i.e., particle-scale and industrial-scale simulations) is presented. Both the well-known Euler/Euler and Euler/Lagrange approach, suitable for large-scale simulations of industrial processes, are introduced in detail. Required modelling for particle-scale transport phenomena is presented and the use of particle-resolved direct numerical simulations for their development is emphasised. Examples of a number of advanced models are presented and their effects on large-scale processes are highlighted.

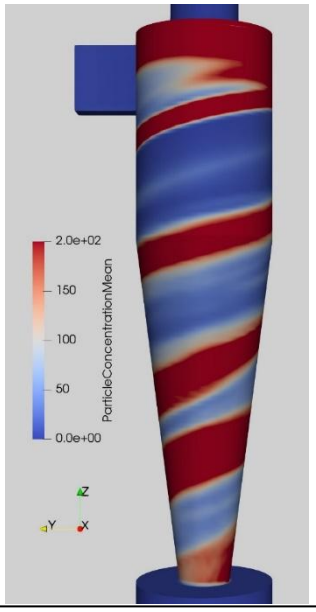
This course is rather unique as it is one of few in the community that is specifically designed to deliver, a) best practice guidance and b) the latest trends in CFD for dispersed multi-phase flows and c) many application examples.

The course appeals to researchers and engineers involved in projects requiring CFD for turbulent dispersed multi-phase flows with bubbles, drops or particles.

Example of Multiphase Flow Simulations

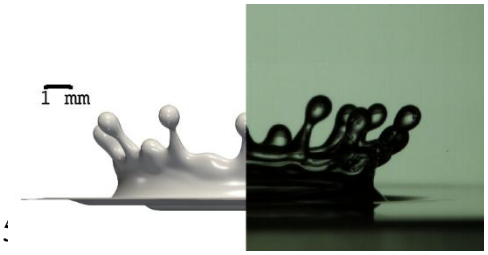


Yales2 CFD-DEM simulation of the instantaneous particle distribution in a fluidised bed close to the wall; particle size 875 microns, solid density 740 kg/m^3, fluidization velocity is 0.32m/s and the number of tracked particles is **9 631 313** representing a total mass of 2.5 kg (LGC/IMFT, Toulouse, 2024).



Euler/Lagrange results for particle separation in a 290mm gas Cyclone with rope formation, inlet velocity 10 m/s, mass loading 1.0, MPS-OvGU 2023)

Interface-resolving simulation of the impact of a water droplet on a thin water film (CRC/TRR 150, TU Darmstadt/KIT, 2024).



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Registration Fees
(A reduction of 50 € applies to ERCOFTAC members)

Deadline for registration: 15th August 2026

- **Industry: 800 €**
- **Academia: 550 €**
- **PhD Students: 400 €**

Each delegate will receive a free copy of the book BPG CFD for Dispersed Multiphase Flows, lunches and coffee breaks are included.

Please note, course fees do NOT include accommodation.

Address of the Event:

National Technical University of Athens (NTUA)
School of Mechanical Engineering, National Technical University of Athens
9 Heroon Polytechniou, Zografou Campus
Athens, Greece

https://www.mech.ntua.gr/en

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