Projects

Diffuse Interface Models of Baer-Nunziato Type

Christoph Müller (SP-A2) Wladimir Reschke (SP-A3) Simone Chiocchetti (SP-A4) Jonas Zeifang (SP-A6) Francesco Bassi (University of Bergamo) Francesco Carlo Massa (University of Bergamo) Marica Pelanti (Université Paris-Saclay) Andrea Beck (University of Stuttgart) Stefanos Fasoulas (University of Stuttgart) Fabian Föll (University of Stuttgart) Timon Hitz (University of Stuttgart) Claus-Dieter Munz (University of Trento) Matteo Ioriatti (University of Trento)



Experimental and Numerical Investigation of Wetting Phenomena on Selected Structured Surfaces and Porous Media

Patrick Foltyn (SP-B1) Robert Haide (SP-B3) Martina Baggio (SP-B5) Alexander Straub (SP-C4) Jan Sijbers (University of Antwerp) Stephanie Fest-Santini (University of Bergamo) Maurizio Santini (University of Bergamo) Dorthe Wildenschild (Oregon State University) Thomas Ertl (University of Stuttgart) Norbert Roth (University of Stuttgart)

Coupling Porous Media and Free Flow with Help of an Upscaled Phase Field Model

Lukas Ostrowski (SP-B4) Sina Ackermann (SP-B6) Sorin Pop (Hasselt University) Andro Mikelić (Université de Lyon) Rainer Helmig (University of Stuttgart) Jim Magiera (University of Stuttgart) Christian Rohde (University of Stuttgart) Lars von Wolff (University of Stuttgart)



Porous Medium

Droplet Impact onto Miscible and

Immiscible Liquids

Bonan Bernard (SP-C1)

Investigation on the Mixing Behavior for



Carole Planchette (TU Graz) Grazia Lamanna (University of Stuttgart)

Oscillation of an Evaporating Spheroidal Drop: Effect on Frequency and Amplitude

Gautham Varma Raja Kochanattu (SP-A1) Gianpietro Elvio Cossali (University of Bergamo) Simona Tonini (University of Bergamo) Günter Brenn (TU Graz) Matthias Ibach (University of Stuttgart) Jonathan Reutzsch (University of Stuttgart) Karin Schlottke (University of Stuttgart) Bernhard Weigand (University of Stuttgart)



Farewell dinner

Our farewell dinner takes place in one of Stuttgart's most prestigious buildings, the television tower. There, you will also have a perfect view over the whole city center.

Together, we will get there using public transportation. Guided travel will be organized from conference center IBZ and the metro station on campus.

Date: September 21st

Departure: 16:00 at IBZ

16:30 at S-Bahn Universität (on campus)

Route: S1/S2/S3 to 'Hauptbahnhof', U7/U15 to 'Ruhbank'



TV tower Stuttgarter Fernsehturm

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Further information

For more information, visit the DROPIT website on project.uni-stuttgart.de/dropit/qualification/summer_school



Research Training Group 2160/1 Droplet Interaction Technologies

> Prof. Bernhard Weigand Prof. Elvio Cossali

Summer School 2018

DROPIT Summer School aims to bring together multidisciplinary scientists to work on droplet interaction related topics using a combination of experimental, numerical and analytical tools.

> September 4th – 21st Stuttgart Germany









Keynote speakers

Dr. Carole Planchette

TU Graz

Granular armors at liquid interfaces

Dense assemblies of capillary adsorbed particles offer remarkable stabilization of interfaces and can be used to reversibly encapsulate liquids without chemical reactions. Yet, the understanding of their mechanical properties and robustness remains limited and restricts their use. Combining quasi-static compression of these interfaces; capillary wave propagation and drop impacts, we show how the properties of individual particles affect the macroscopic behavior of the granular armor.

Prof. Filip Sadlo

Heidelberg University

Visualization of Droplet Dynamics

Droplet dynamics is governed by a multitude of physical mechanisms, and exhibits high phenomenological diversity. In this talk, we investigate different visualization approaches that help in the analysis of the resulting phenomena, such as collision and dispersion, but also support reasoning with respect to the underlying physical mechanisms, such as surface tension, oscillation, and interaction with the surrounding gas.

Prof. Shamit Bakshi

Indian Institute of Technology, Madras

Drop impact onto super-hydrophobic surfaces with macro-structures

The talk will mainly focus on the hydrodynamics of drop impact onto a super-hydrophobic surface (SHS) with macro-structures. These surfaces have the potential to shed droplets faster than SHS and hence are attractive for practical applications. We show that the impact configuration plays a crucial role in the fluid dynamics of the process.

Prof. Dorthe Wildenschild

Oregon State University

Exploring wettability states and alterations in porous media multiphase flow systems using 3D imaging

To better understand the processes of wettability alteration and its effect on multi-phase flow processes (such as capillary trapping of CO2), we present analyses of fluid-fluid interfaces in porous media, using interface curvatures and contact angles to track wettability states. Synchrotron-based xray computed microtomography is used to generate high-resolution, threedimensional observations of multiphase fluid transport in porous media. Interface curvature estimation is accomplished with a method that combines selective interface modification and distance weighting approaches. This methodology can also yield important new insights regarding the pressure state of both connected and disconnected fluid phases during drainage and imbibition. As an example, changes in oil-water interfacial orientation was observed via changes in curvature histograms, indicating wettability alteration of the solid medium over the course of an experiment. Wettability alteration can similarly be characterized using measurements of contact angle, also based on three-dimensional images. Together, these various types of image-based measurements provide new important insights regarding wettability states, its potential alteration, and alteration sources, all information that supports improved strategies for CO2 storage, environmental remediation, and oil recovery.

Program | Kick-off meeting | Sept. 4th

- 8:45 Arrival & coffee
- 9:00 Welcome speech Prof. Bernhard Weigand
- 9:15 Keynote talk Granular armors at liquid interfaces Dr. Carole Planchette
- 9:50 Project introduction Diffuse Interface Models of Baer-Nunziato Type
- 10:10 Project introduction Experimental and Numerical Investigation of Wetting Phenomena
- 10:30 Coffee break
- 11:00 Project introduction Investigation on the Mixing Behavior for Droplet Impact onto Miscible and Immiscible Liquids
- 11:20 Project introduction Oscillation of an Evaporating Spheroidal Drop: Effect on Frequency and Amplitude
- 11:40 Project introduction Coupling Porous-Media and Free Flow with Help of an Upscaled Phase-Field Model
- 12:00 Keynote talk Visualization of Droplet Dynamics Prof. Filip Sadlo
- 12:35 Lunch

Program | Final meeting | Sept. 21st

- 09:40 Arrival & coffee
- 10:00 Introductory remarks Prof. Bernhard Weigand

10:10 Keynote talk Drop impact onto super-hydrophobic surfaces with macro-structures Prof. Shamit Bakshi

- 10:45 Project discussion Diffuse Interface Models of Baer-Nunziato Type
- 11:15 Coffee break
- 11:30 Project discussion Experimental and Numerical Investigation of Wetting Phenomena
- 12:00 Project discussion Investigation on the Mixing Behavior for Droplet Impact onto Miscible and Immiscible Liquids
- 12:30 Lunch

13:30 Project discussion Oscillation of an Evaporating Spheroidal Drop: Effect on Frequency and Amplitude

- 14:00 Project discussion Coupling Porous-Media and Free Flow with Help of an Upscaled Phase-Field Model
- 14:30 Coffee break
- 14:45 Keynote talk Exploring wettability states and alterations in porous media multi-phase flow systems using 3D imaging Prof. Dorthe Wildenschild