

| Monday, 11 November 2019 | | | | |
|----------------------------------|-------|------------------------------------|---|--|
| Short Course on Multiphase Flows | | | | |
| Time | | Lecturer | Affiliation | Title |
| 12:00 | 13:30 | Registration | | |
| 13:30 | 13:40 | D. Lucas | Helmholtz-Zentrum Dresden-Rossendorf, Germany | General Information |
| 13:40 | 13:50 | G. Gerbeth | Helmholtz-Zentrum Dresden-Rossendorf, Germany | Welcome |
| 13:50 | 14:50 | G. Scheuerer | ISimQ GmbH, Warngau, Germany | Lecture 1: Mathematical Models for Multiphase Flows: Overview & Basic Equations |
| 14:50 | 15:10 | Break with Coffee, Tea & Beverages | | |
| 15:10 | 16:10 | T. Esch | ANSYS Germany, Otterfing | Lecture 2: Lagrangian Two-Phase Flow Modelling |
| 16:10 | 16:30 | Break with Coffee, Tea & Beverages | | |
| 16:30 | 17:30 | U. Hampel | Helmholtz-Zentrum Dresden-Rossendorf, Germany | Lecture 3: Measurement Techniques and Experimental Investigations for Multiphase Flows |
| 17:30 | 17:50 | All | Discussion, Questions & Answers | |
| 17:50 | | Transfer to Dresden | | |

| Tuesday, 12 November 2019 | | | | |
|----------------------------------|----------|---|---|---|
| Short Course on Multiphase Flows | | | | |
| Time | Lecturer | Affiliation | Title | |
| 08:30 | 09:00 | Registration | | |
| 09:00 | 10:00 | H. Eickenbusch | ANSYS Germany, Otterfing | Lecture 4: Eulerian Multiphase Flow Modelling: Phase Interaction Models |
| 10:00 | 10:20 | Break with Coffee, Tea & Beverages | | |
| 10:20 | 11:20 | M. Peric | Siemens Industry Software GmbH, Germany | Lecture 5: Modelling of free-surface flows with focus on the VOF Method |
| 11:20 | 11:40 | Break with Coffee, Tea & Beverages | | |
| 11:40 | 13:00 | R. Rzehak | Helmholtz-Zentrum Dresden-Rossendorf, Germany | Lecture 6: Poly-Disperse Bubbly Flows & Chemical Reaction |
| 13:00 | 13:05 | Group Photo | | |
| 13:05 | 14:05 | Lunch | | |
| 14:05 | 15:05 | M. Peric | Siemens Industry Software GmbH, Germany | Lecture 7: Interfacial Heat and Mass Transfer Models |
| 15:05 | 15:50 | T. Höhne | Helmholtz-Zentrum Dresden-Rossendorf, Germany | Lecture 8: Stratified & Segregated Flow Modelling - Interfacial Area Density Model - AIAD |
| 15:50 | 16:10 | Break with Coffee, Tea & Beverages | | |
| 16:10 | 16:55 | D. Lucas | Helmholtz-Zentrum Dresden-Rossendorf, Germany | Lecture 9: Multi-Scale Modelling Techniques - GENTOP |
| 16:55 | 17:55 | F. Schlegel / Ch. Greenshields | HZDR Germany / OpenFOAM foundation, UK | Lecture 10: Flexible development framework for the Euler-Euler approach |
| 17:55 | 18:15 | All | Discussion, Questions & Answers | |
| 18:15 | | Transfer to Dresden | | |
| 19:00 | | Short Course Dinner @ Restaurant "Schillergarten" | | |

| Wednesday, 13 November 2019 | | | | |
|---|-------|---|---|--|
| Short Course on Multiphase Flows - Code Capabilities & Experimental (Parallel Sessions) | | | | |
| Time | | Lecturer | Affiliation | Title |
| Code capabilities part | | | | |
| Plenum | | | | |
| 09:00 | 09:35 | M. Braun | ANSYS Germany | Lecture 11: Multiphase Flow Capabilities in FLUENT / CFX |
| 09:35 | 10:10 | F. Klippel | Siemens PLM, UK | Lecture 12: Multiphase Flow Capabilities in STAR-CCM+ |
| 10:10 | 10:45 | Ch. Greenshields | OpenFOAM foundation, UK | Lecture 13: Multiphase Flow Capabilities in OpenFOAM |
| 10:45 | 11:00 | Break with Coffee, Tea & Beverages | | |
| Parallel Sessions | | | | |
| 11:00 | 12:00 | T. Esch | ANSYS Germany | Lecture 14: FLUENT / CFX demonstration |
| 11:00 | 12:00 | C. Santarelli & F. Klippel | Siemens PLM, Germany | Lecture 15: STAR-CCM+ demonstration |
| 11:00 | 12:00 | Ch. Greenshields | OpenFOAM Foundation | Lecture 16: OpenFOAM demonstration |
| Experimental part | | | | |
| 09:00 | 12:00 | E. Schleicher & A. Bieberle | Helmholtz-Zentrum Dresden-Rossendorf, Germany | Interactive Seminar on the Application of Two-Phase Flow Measuring Techniques - Wire-Mesh Sensors & Gamma CT |
| 12:00 | 13:00 | Lunch | | |

| | | | | |
|--|-------|--|---|--|
| 12:30 | 13:00 | Registration Conference | | |
| Wednesday, 13 November 2019 - Multiphase Flow Conference - Session 1 | | | | |
| Chair: | | T. Höhne | Helmholtz-Zentrum Dresden-Rossendorf | |
| Time | | Presenter | Affiliation | Title |
| 13:00 | 13:10 | R. Sauerbrey | Helmholtz-Zentrum Dresden-Rossendorf | Welcome |
| 13:10 | 13:35 | J. Peltola | VTT Technical Research Centre of Finland Ltd | On non-drag interfacial force and thermal phase change modelling of reactingEulerFoam |
| 13:35 | 14:00 | Ch. Sam | Boehringer Ingelheim RCV GesmbH & Co KG | Application of Computational Fluid Dynamics (CFD) in biopharmaceutical industry: increasing scale-up insight and directing optimization |
| 14:00 | 14:25 | J. Schulz | Technische Universität Berlin | Transport processes and interfacial phenomena in disperse multiphase systems - An experimental single drop study |
| 14:25 | 14:50 | D. Papoulias | Siemens Industries software Computational Dynamics Ltd. | Population balance modelling of polydispersed bubbly flow in obstructed pipe |
| 14:50 | 15:15 | M. Olbrich | Physikalisch-Technische Bundesanstalt (PTB) | A machine learning approach to liquid level extraction from video observations in multiphase flow metrology |
| 15:15 | 15:45 | Coffee, Tea & Beverages | | |
| Multiphase Flow Conference - Session 2 | | | | |
| Chair: | | T. Esch | ANSYS Germany, Otterfing | |
| Time | | Presenter | Affiliation | Title |
| 15:45 | 16:10 | M. A. Taborda | Otto-von-Guericke-University Magdeburg | Modelling of bubble columns considering mass transfer, chemical reactions and effects of bubble dynamics in the frame of LES-Euler/Lagrange approach |
| 16:10 | 16:35 | H. Stel | Federal University of Technology, Curitiba, Brazil | Numerical and Experimental Study of Gas-Liquid Flows in a Centrifugal Rotor |
| 16:35 | 17:00 | K. Angele | Vattenfall AB, R&D Business Strategy, Sweden | A novel and simple rule-of-thumb for the onset of cavitation after orifice plates |
| 17:00 | 18:30 | Visit of the Experimental Facilities @ Institute of Fluid Dynamics | | |
| 18:30 | | Transfer to the hotels | | |

| Thursday, 14 November 2019 | | | | |
|--|-------|-------------------------|---|--|
| Multiphase Flow Conference - Session 3 | | | | |
| Chair: | | R. Rzehak | Helmholtz-Zentrum Dresden-Rossendorf | |
| Time | | Presenter | Affiliation | Title |
| 09:00 | 09:45 | I. Bolotnov | North Carolina State University Raleigh, NC, USA | <u>Keynote:</u> DNS and Interface-capturing simulations of two-phase flows in complex geometries |
| 09:45 | 10:10 | J. Fröhlich | Institute of Fluid Mechanics, Technische Universität Dresden | Direct Numerical Simulation of sediment transport with non-spherical polydisperse particles |
| 10:10 | 10:35 | E. Trautner | Bundeswehr University Munich | A Direct Numerical Simulation analysis of coherent structures in bubble-laden channel flows |
| 10:35 | 11:00 | K. Singh | University of Nottingham, UK | A Computational Study on the Disintegration Mechanism of Liquid from a Rotary Disk Atomizer |
| 11:00 | 11:30 | Coffee, Tea & Beverages | | |
| Multiphase Flow Conference - Session 4 | | | | |
| Chair: | | D. Papoulias | Siemens PLM, Germany | |
| Time | | Presenter | Affiliation | Title |
| 11:30 | 11:55 | J. Schlottke | MAHLE Stuttgart | CFD simulation of multiphase flow in evaporators |
| 11:55 | 12:20 | N. Homma | Mitsubishi Electric R&D Centre Europe Livingston, UK | Multiphase Lattice Boltzmann Simulation of Self-propelling Droplet on Wettability Gradient Surface |
| 12:20 | 12:45 | M. Haustein | TU Bergakademie Freiberg | Optical Investigation of Segregation Processes in dense Suspensions |
| 12:45 | 12:50 | Group Photo | | |

| | | | | |
|--|-------|---|---|--|
| 12:50 | 13:45 | Lunch | | |
| Multiphase Flow Conference - Session 5 | | | | |
| Chair: | | I. Bolotnov | North Carolina State University Raleigh, NC, USA | |
| Time | | Presenter | Affiliation | Title |
| 13:45 | 14:10 | X. Yang | CoC Fluid Dynamics, Bosch Rexroth | Efficient one-way simulation of bubble dispersion and resulted interaction |
| 14:10 | 14:35 | T. Wacławczyk | Warsaw University of Technology, Poland | Modeling of non-equilibrium effects in intermittency region between immiscible phases |
| 14:35 | 15:00 | G. Montoya | ANSYS, Inc. Lebanon, USA | On the implementation and validation of the Algebraic Interfacial Area Density (AIAD) model in the CFD code FLUENT |
| 15:00 | 16:30 | Poster Session with Coffee, Tea & Beverages - Votes for the Best Poster Award - see Poster list | | |
| Multiphase Flow Conference - Session 6 | | | | |
| Chair: | | Y. Liao | Helmholtz-Zentrum Dresden- Rossendorf | |
| 16:30 | 16:55 | D. Kreitmayer | Ruprecht-Karls-Universität Heidelberg | Simulation of the fluid dynamic characteristics of a stirred tank bioreactor |
| 16:55 | 17:20 | S. C. Ozan | Norwegian University of Science and Technology, Norway | Coalescence: from film drainage models to population balance framework |
| 17:20 | 17:45 | A. Mühlbauer | Technische Universität Kaiserslautern | Modeling solid-particle effects in slurry bubble columns |
| 17:45 | 18:10 | P. Fuchs | Ruhr Universität Bochum | Preliminary results of water hammer simulation in two-phase flow regimes using different OpenFOAM packages |
| 18:15 | | Transfer to the Restaurant "Pulverturm" | | |
| 19:00 | 21:30 | Conference Dinner @ Restaurant "Pulverturm" | | |

| Friday, 15 November 2019 | | | | |
|--|-----------|-------------------------|--------------------------------------|--|
| Multiphase Flow Conference - Session 7 | | | | |
| Chair: | | F. Schlegel | Helmholtz-Zentrum Dresden-Rossendorf | |
| Time | Presenter | Affiliation | Title | |
| 09:00 | 09:45 | H.-M. Prasser | ETH Zürich, Switzerland | <u>Keynote:</u> Measurements in Dynamic Liquid Films |
| 09:45 | 10:10 | J. Lefers | Forschungszentrum Jülich GmbH | Experimental Investigation and Evaluation of Multiphaseflow Reactors for Power-to-Fuel Processes |
| 10:10 | 10:35 | J. E. Olsen | SINTEF Norway | Pros & cons of the coupled DPM and VOF models in bubbly flow modelling |
| 10:35 | 10:55 | Coffee, Tea & Beverages | | |
| Multiphase Flow Conference - Session 8 | | | | |
| Chair: | | H.-M. Prasser | ETH Zürich, Switzerland | |
| Time | Presenter | Affiliation | Title | |
| 10:55 | 11:20 | M. Sayed | Paul Scherrer Institut Switzerland | On the Prediction of Turbulent Kinetic Energy in Turbulent Channel Flows Using Wall-modeled Large Eddy Simulations |
| 11:20 | 11:45 | L. Vyskocil | UJV Rez a. s., Czech Republic | CFD Simulation of the Departure from Nucleate Boiling in Pipes |
| 11:45 | 12:10 | V. Gall | Karlsruhe Institute of Technology | Investigation of cavitation patterns in high-pressure homogenization nozzles using shadow-graphic images |
| 12:10 | 12:35 | A. Soldati | TU Wien | Computation of Breakage, Coalescence and Size Distribution of Surfactant Laden Drops in Turbulence |
| 12:35 | 12:40 | Closure | | |
| 12:40 | 13:00 | Snacks & Beverages | | |

Poster - Best poster will be selected by the participants

| Poster - Best poster will be selected by the participants | | |
|---|--|--|
| Abdullahi, M. | Kaduna Polytechnic, Nigeria | Experimental measurements of gas entrainment rates in gas-liquid two-phase slug flows in horizontal and slightly inclined pipes |
| Ahmed, I. | University of Leeds, UK | Development of Unified Taylor Bubble Drift Velocity Correlation Using CFD Simulation and Published Data |
| Akashi, M. | Helmholtz-Zentrum Dresden-Rossendorf | X-ray radiographic visualization of bubbly flows injected by a top submerged lance in a liquid metal layer |
| Asad, A. | Technische Universität Bergakademie Freiberg | Numerical Assessment of Reactive Cleaning of Steel Melt in an Induction Crucible Furnace |
| Bang, K.-H. | Korea Maritime and Ocean University, Korea | Multiphase Flow Modeling of Molten Fuel-Coolant Interactions in Nuclear Reactor Severe Accidents |
| Cao, Y. | Technische Universität München | Numerical simulation of compressible air bubble rising in quiescent water with heat transfer |
| Chudjak, M. | Comenius University Bratislava, Slovakia | Reconstruction of the shape of asymmetric elongated bubble moving in downward liquid flow |
| Collado, F. J. | University of Zaragoza, Spain | New balances for one-dimensional two-phase flow |
| Crha, J. | University of Chemistry and Technology, Prague, Czech Republic | Single Rising Bubble - COMSOL and Fluent Comparison |
| Fomichev, E. | Rusal ETC, Russia | Simulation of Solids Flocculation by CFD-PBM |
| Giefer, P. | Leibniz-Institut für Werkstofforientierte Technologien - IWT, Bremen | Numerical investigation of interfacial stress in liquid-liquid flow through porous structures |
| Hernandez-Avellaneda, A. | Universidad Politecnica de Madrid, Spain | Dry storage cask reflooding analysis using a subchannel geometry with an Eulerian multiphase model |
| Hessenkemper, H. | HZDR, Germany | Airlift reactor - experiment and CFD simulation |
| Hlawitschka, M. | University of Kaiserslautern | Bubble oscillation: Influence to reactive mass transfer |
| Hollingshead, C. | McMaster University, Hamilton, Canada | An Experimental and numerical investigation into the effect of tube array geometry on the single-phase velocity field during Natural Circulation |
| Höhne, T. | Helmholtz-Zentrum Dresden-Rossendorf | Stratified & Segregated Flow Modelling - Interfacial Area Density Models - AIAD |
| Hundshagen, M. | Ruhr Universität Bochum | Numerical Investigation of Centrifugal Pumps for Gas-Laden Liquids with Closed and Semi-Open Impellers |
| In, W. K. | Korea Atomic Energy Research Institute, Daejeon, Korea | Reflood quenching of uncoated and CrAl-coated Zircaloy-4 claddings in single tube |
| Ishimoto, J. | Tohoku University, Japan | Coupled peridynamics and Euler method for leaked hydrogen-air mixing with crack propagation of solid wall |
| Kanjilal, S. | Johannes Kepler Universität, Linz, Austria | A revised coarse grain approach in simulation of hopper flow with polydisperse particles |

Poster - Best poster will be selected by the participants

| Poster - Best poster will be selected by the participants | | |
|---|--|--|
| Karp, J. | Federal University of Technology - Paraná, Brazil | On the Dynamics of Oil Encapsulated Bubbles |
| Katrilaka, Ch. | Aristotle University of Thessaloniki, Greece | CFD study of the co-current horizontal flow of a Newtonian & a non-Newtonian fluid in a μ -channel: Effect of non-Newtonian rheology on slug formation |
| Kolesov, E. | Mining Institute of the Ural Branch of the Russian Academy of Science Perm | Numerical simulation of exhaust gas dilution in blind headings of underground mines |
| Y. Liao | HZDR, Germany | Baseline Model for Two-Fluid CFD-Simulation of Dispersed Bubbly Flow |
| Liu, X. | University of Strathclyde Glasgow, UK | A Novel Method of Predicting Two-Phase Flow Patterns in Inclined Pipes via Machine Learning by TensorFlow |
| Lobanov, P. | Kutateladze Institute of Thermophysics SB RAS, Novosibirsk, Russia | Experimental investigation of gas phase distribution and heat transfer in two phase gas-liquid flow in a rod bundle |
| Ma, L. | iPhase Ltd., UK | On the life and habits of gas-core slugs |
| Marino, J. | Technische Universität Darmstadt | A new Modified Normalized Weighting Factor method for efficiency improvement of High-Resolution convective schemes in the context of multiphase flows |
| Montante, G. | Università di Bologna | Effect of turbulent dispersion on the solid concentration distribution in stirred tanks |
| Narayan, N.M. | Universität Bremen | A 3D-Multiphase Numerical Analysis of Intensive Cooling of Metal Plates |
| Nöpel, J. | Technische Universität Dresden | Experimental investigation of local conditions for chemical conversion of a dye by hydrodynamic cavitation |
| Norouzi, M. | Universitat Rovira i Virgili Tarragona, Spain | Deformation, orientation and spatial distribution of long flexible fibers in viscous flows |
| Obiso, D. | CIC Virtuhcon, TU Bergakademie Freiberg | Validation of a VOF approach for the Top-Submerged gas injection in liquid metal |
| Ochoa, S. | Karlsruhe Institute of Technology | Mercury Ring Pump Modelling: Concepts, Progress and Challenges |
| Oyegbile, B. | Stellenbosch University South Africa | Coupled Eulerian-Lagrangian Modelling of Non-Cohesive Particle Dispersion in an Enclosed Batchelor Flow |
| Park, H.S. | POSTECH Pohang, Korea | Applicability of the CFD-DEM algorithm on the prediction of single-phase flow pressure drop in porous media with the particle size distribution |
| Petersen, J. | NORCE Norwegian Research Centre AS, Bergen, Norway | Study of the interaction between spherical particles of different sizes in horizontal fluid flow in a pipe - Experiment, static and dynamic modelling |
| Rajabnia, H. | Sabancı University, Istanbul, Turkey | Experimental Investigation of the effect of external magnetic field on nucleate pool boiling heat transfer of ferrofluid on modified surfaces |
| Rzehak, R. | Helmholtz-Zentrum Dresden-Rossendorf | Euler-Euler Simulation of Fluid Dynamics and Mass Transfer in Bubbly Flows |

Poster - Best poster will be selected by the participants

| | | |
|-------------------|--|--|
| Saleh, S. | University of Tikrit, Irak | CFD simulation of hydrodynamic of Ebullated Bed Reactor (EBR) for heavy oil hydroprocessing |
| Schäfer, J. | Technische Universität Kaiserslautern | Evaluation of droplet size distribution in a mixer-settler using a convolutional neural network |
| Schlegel, F. | Helmholtz-Zentrum Dresden-Rossendorf | A flow pattern adaptive multi-field two-fluid concept for turbulent two-phase flows |
| Schmeyer, E. | Physikalisch-Technische Bundesanstalt (PTB), Berlin | Comparison of flow structures for different geometries |
| Schmitt, P. | Technische Universität Kaiserslautern | Experimental and numerical study on droplet breakup in a centrifugal pump |
| Semin, M. | Mining Institute of the Ural Branch of the Russian Academy of Sciences, Russia | Numerical simulation of heat and mass transfer in water-saturated porous rock during freezing |
| Spanos, G. M. | Aristotle University of Thessaloniki, Greece | Hydrodynamic characteristics of free-flowing non-Newtonian liquid film in open inclined microchannel: Experimental investigation |
| Vachaparambil, K. | Norwegian University of Science and Technology (NTNU) Trondheim, Norway | Spurious velocities in the Volume of Fluid method: modeling a sub-millimeter bubble |
| Wickert, D. | Technische Universität Dresden | Simulation of water evaporation under natural conditions - a state of the art overview |
| Wirz, D. | Technische Universität Kaiserslautern | Experimental and numerical investigation of hydrodynamics in a DN 300 pumpmix mixer |
| Zedler, P. | Technische Universität Dresden | Experimental investigation of passive heat removal systems for spent fuel pools |