

EFCE SpotLight Talks

Working Party on Multiphase
Fluid Flow

25 May
2023

14:00 • 16:30

CEST

THE ADVENTUROUS JOURNEY OF A REACTING SPECIES ON ITS RIDE THROUGH A MULTIPHASE REACTOR – NEW INSIGHTS WITH LAGRANGIAN ANALYSIS



For the design and operation of multiphase reactors, data averaged over time and space are usually used, which provide statistical information on residence time distributions, dispersion coefficients or energy dissipation rates. From the perspective of a reacting species element, such as a gas bubble, a catalytic particle, or a cell, its Lagrangian trajectory and experienced conditions on its journey through the reactor are more important. Inhomogeneities in temperature, concentrations or shear stresses and the duration of exposure of reacting species elements along their trajectories to these conditions are not captured by current approaches. Especially, because often only the mean velocity fields are derived and considered as a representative dynamical system. New experimental methods with Lagrangian Sensor Particles and 4D Particle Tracking Velocimetry as well as new analytical methods using Lagrangian Coherent Structure Analysis generate new opportunities to follow reactive species in multiphase reactors on their individual paths. We are confident, that these new methods which will be discussed with limits and opportunities in our Spotlight Talk will initiate a paradigm shift in the characterisation of multiphase flows.

PROGRAM

- 14:00 **Welcome and introduction**
Prof. Michael Schlüter - Chair WP on Multiphase Fluid Flow, Hamburg Univ. Tech. – Germany
Prof. Alexandra von Kameke, HAW Hamburg - Germany
Prof. David Bogle, Former EFCE Scientific Vice-President
- 14:10 **Recent developments in LCS Analysis - Diffusive and active transport barrier detection**
Prof. George Haller, Institute of Mechanical Systems, ETH Zürich – Switzerland
- 14:40 **Can we live Danckwerts dream? - PTV-Experiments and LCS Analysis**
Prof. Alexandra von Kameke, University of Applied Sciences, Hamburg – Germany
- 15:10 *Break*
- 15:20 **Are inertial bubbly flows confined in planar thin-gap cells possible innovative bubbly reactors? What we have learnt about Agitation, Mixing and Mass transfer using PIV, PLIF and Shake-The-Box techniques**
Prof. Véronique Roig, Patricia Ern and Sébastien Cazin, Inst. Meca. Fluides, Toulouse - France
- 15:50 **Streamline analyses of CFD simulations to evaluate the process performance of stirred tank reactors**
Dr. Arne Hoffmann, Dr. Sebastian Meinicke, BASF SE, Ludwigshafen - Germany
- 16:20 **Discussion: Paradigm shift in the characterisation of multiphase flows**
Conclusion

[Registration](#)

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free of charge but mandatory