Best Practices in Combustion CFD
Internal Combustion Engines

Wednesday, November 2nd 2016

8:20	**Registration and Welcome**	Prof. A Sadiki
	Best practices for combustion chemistry and turbulent combustion modeling	
8:45	Combustion Chemistry: Detailed chemistry and Reduction strategies	Prof. U. Maas
9:30	Combustion chemistry: Applications to IC Engines	Prof. U. Maas
10:00	**Refreshments**	
10:30	Challenges in Turbulent Combustion modeling in IC engines	Prof. F. Di Mare
11:30	Ignition modeling in IC Engines	Prof. U. Maas
12:00	Discussion	
12:30	**Lunch**	
	Best practices for Spray and Atomization in IC-Engine	
13:30	Spray and Atomization in IC Engine: Break up and Atomization	Prof. A. Sadiki
14:30	Spray and Atomization in IC Engine: Turbulent spray and Mixture Formation	Prof. A. Sadiki
15:30	**Refreshments**	
16:00	Experiments for CFD validation	Dr.-Ing. B. Boehm
17:00	Overview of BPG and closing discussion	Prof. D. Roekaerts
17:30	**Close**	

Evening: course dinner

Thursday, November 4th, 2016

8:30	**Coffee**	
	Best practice for modeling Complex fuels and Unsteady Simulation Techniques	
9:00	Complex fuel and multicomponent droplet evaporation	Prof. C. Hasse
10:00	Hybrid LES/RANS in IC Engine	Prof. C. Hasse
11:00	**Refreshments**	
	Best practice guidelines for internal engine CFD	
11:30	CFD for internal engine design – Part 1	Dr. O. Laget
12:30	**Lunch**	
13:30	CFD for internal engine design – Part 2	Dr. O. Laget
14:30	**Mini workshop on CFD in IC-Engine applications:** Participants and lecturers are invited to give a short presentation on a IC Engine CFD application using the CFD tools of their interest, with emphasis on challenging issues. The discussion will focus on which best practices can be identified for the presented cases.	Prof. A. Sadiki
16:00	**Conclusion**	
16:30	**End**	

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Background and objectives:

Design and operation of modern combustion engines faces the need to combine high efficiency with low pollutants emissions, even under real traffic conditions. Computational Fluid Dynamics has become a powerful tool in design and analysis of internal engines. Many numerical models exist, each having a range of applicability, computational cost and accuracy. Consequently, CFD experts involved in internal engine simulations, in addition to usual CFD skills, need specific insight and knowledge in spray and combustion modelling in order to conduct thorough analysis. The present course addresses this need.

In this course, the participants will learn the best practices in CFD of internal engines. They will discover how to select models, how to validate numerical simulations, and which accuracy to expect. Spray injection, flame ignition, flame propagation, pollutants emissions, efficiency and knock effects, including complex fuels, are critical issues in the design of modern internal engines and a major part of the course is devoted to them.

The lectures of this course, all by well-known experts in the field, cover from basics to applications.

The course is held at the occasion of the publication of the ERCOFTAC Best Practice Guide on CFD of combustion, a copy of which will be provided to the participants.

In the course also the link will be made with the CFD programs and cases of interest for the participants. As a result, the course provides the means for CFD analysts to significantly enhance their use of commercial and open-source CFD software for combustion engineering applications.

Lecturers:

Prof. U. Maas, Karlsruhe Institute of Technology, Germany
Prof. F. Di Mare, TU Darmstadt, Germany
Prof. A. Sadiki, TU Darmstadt, Germany
Dr.-Ing. B. Boehm, TU Darmstadt, Germany
Prof. C. Hasse, TU Freiburg, Germany
Dr. O. Laget, IFPEN, France
Prof. D. Roekaerts, TU Delft, The Netherlands

Fees:
ERCOFTAC Members €595 Non-members €895.
Please note Course fees do NOT include accommodation