



**Best Practices in Combustion CFD  
Gas Turbines – Explosions**  
*Naples, Italy, 22-23 September 2017*

Hosted by  
**Istituto di Ricerche sulla Combustione-Consiglio  
Nazionale delle Ricerche (IRC-CNR)**

Co-Chairs:  
Dr. Valeria Di Sarli &  
Dr. Luc Vervisch

## FRIDAY SEPTEMBER 22, 2017

8:15	<b>Registration and Welcome</b>	Dr. Valeria Di Sarli
	<b>Turbulent combustion modeling</b>	
8:30	Challenges and fundamentals	L. Vervisch
9:30	Modeling strategies	L. Vervisch
10:30	<b>Refreshments</b>	
	<b>Best practices for CFD of GT</b>	
11:00	Spray modeling in GT	B. Cuenot
12:00	Combustion and pollutant modeling in GT	B. Cuenot
13:00	<b>Lunch</b>	
14:00	CFD for virtual prototyping of GT – Part 1	L. Gicquel
15:00	CFD for virtual prototyping of GT – Part 2	L. Gicquel
16:00	<b>Refreshments</b>	
	<b>Best practices for CFD of explosions</b>	
16:30	Explosion physics	V. Di Sarli
17:30	<b>Close</b>	

**Evening: Course dinner**

## SATURDAY SEPTEMBER 23, 2017

8:30	<b>Coffee</b>	
	<b>Best practices for CFD of explosions</b>	
9:00	Explosion modeling	V. Di Sarli
10:00	<b>Concluding discussion</b>	
10:30	<b>Refreshments</b>	
10:50	<b>Mini workshop on CFD in gas turbine and explosion applications:</b> Participants and lecturers are invited to give a short presentation on a gas turbine or explosion 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.	V. Di Sarli & L. Vervisch
12:20	<b>Lunch</b>	
13:10	<b>End</b>	



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### **Background and objectives:**

Design and operation of modern gas turbine engines faces the need to combine high efficiency with low pollutants emissions. At the same time, safe design and operation of such engines as well as, more generally, of any industrial chemical plants where flammable substances are stored, handled, processed or produced, requires prevention of unwanted combustion phenomena, such as explosions, and/or mitigation of their consequences. This course addresses both subjects in the perspective of Computational Fluid Dynamics. CFD has become a powerful tool in design and analysis of aero engines as well as land based and marine turbines. In addition, it is becoming one of the most important tools for investigating explosion scenarios.

Many numerical models exist, each having a range of applicability, computational cost and accuracy. Consequently, CFD experts involved in combustion engine and explosion simulations, in addition to usual CFD skills, need specific insight and knowledge in multi-phase flow and combustion modelling in order to conduct thorough analysis.

In this course, the participants will learn the best practices in CFD of gas turbine combustors and explosions. They will discover how to select models, how to validate numerical simulations, and which accuracy to expect. A major part of the course is devoted to the main critical issues in the design of modern gas turbine engines (such as spray injection, flame ignition, flame propagation, pollutants emissions, efficiency, including complex alternative fuels) and simulation of explosions (such as dispersion and mixing of reactants, unsteady flame propagation in closed vessel, transient flame-vortex interaction, flame acceleration, pressure evolution).

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

The course is partially based on 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:**

Dr. Benedicte Cuenot, CERFACS, Toulouse, France  
Dr. Valeria Di Sarli, IRC-CNR, Napoli, Italy  
Dr. Laurent Gicquel, CERFACS, Toulouse, France  
Prof. Luc Vervisch, INSA de Rouen Normandie, France

### **Fees:**

ERCOFTAC Members €450 Non-members €750  
Students : €340  
Please note Course fees do NOT include accommodation.