



## **8<sup>th</sup> International Workshop on the Turbulent Combustion of Sprays (TCS-8)\***

**January, 22, 2023**

**Steigenberger Nile Palace Luxor Hotel and Convention Centre in Luxor, Egypt**

### **Program** (version of November 18, 2022)

8:30-9:15: Registration and poster setup  
9:15-9:30: Welcome and announcements  
9:30-10:30: Invited lecture by **Dr. Aymeric Vié**

### **Challenges in the numerical simulation of sprays in turbulent liquid-fueled swirled burners**

(Abstract on next page)

10:30-11:00: Coffee break  
11:00-13:00: Presentation/discussion on benchmark test cases  
11:00-11:45: CORIA Rouen Spray Burner  
11:45-12:30: Sydney Needle Spray Burner  
12:30-13:00: Cambridge Swirl Spray Flames  
  
13:00-14:30: Lunch and posters\*\*  
  
14:30-15:30: Invited highlight presentations by young researchers:  
Ral Bielawski (Univ Michigan): Atomization by interaction with shocks  
Ambrus Both (BCS, Barcelona): Evaporation of volatile droplets in flame-like conditions  
Callum Kennedy (Univ Sydney): Sprays for material synthesis using flame spray pyrolysis  
  
15:30-15:50: Coffee break  
15:50-16:30: Overall evaluation and future directions

\* **Further information** on the TCS workshops can be found at [www.tcs-workshop.org](http://www.tcs-workshop.org)

**Registration for TCS8 is required and can be done at**

<https://www.ercoftac.org/events/8th-international-workshop-on-turbulent-combustion-of-sprays/>

\*\* **Participants are invited to present their own recent work in a poster.** Please send titles, authors and affiliations to Prof. Bart Merci ([bart.merci@ugent.be](mailto:bart.merci@ugent.be)) before December 16, 2022.

## ABSTRACT OF INVITED LECTURE

Dr. Aymeric Vié

Laboratoire EM2C, CNRS & CentraleSupélec, Université Paris-Saclay, France

### **Challenges in the numerical simulation of sprays in turbulent liquid-fueled swirled burners**

In aeronautical combustion chambers, several physical phenomena must be considered for predictive simulations, such as combustion, turbulence, or two-phase flows. Furthermore, the design of combustion chambers, with multiple swirler stages and injectors, leads to a great richness in the behavior of the combustion chamber, for example, on pollutant emissions or acoustic activity. In this presentation, I will first discuss how turbulent swirled spray combustors can generate a wide variety of flame archetypes, using as an example the results of the BIMER experimental test rig of the EM2C laboratory. Then, I will open the discussion to today's challenges in terms of modeling. I will focus on the spray and highlight the state-of-the-art for different modeling blocks and the challenges in accuracy and efficiency.

### BENCHMARK TEST CASES

Interesting new insight will be gained from the comparative study of models and experiments.

#### **CORIA Rouen Spray Burner**

Coordinator: Prof. Bruno Renou, CORIA, France

Expected contributions:

- **Test Case n°1 : Reactive flow (coordinator Antoine Stock)**
  - Iván Olmeda, José M García-Oliver, José Manuel Pastor, Daniel Mira and Ambrus Both, CMT Motores Térmicos & BSC, Spain
  - Teng Zhang, Nanjing University of Aeronautics and Astronautics (NUAA), China
  - Abouelmagd Abdelsamie and D. Thevenin, University of Magdeburg, Germany
  - Antoine Stock and Vincent Moureau, CORIA, France
- **Test Case n°2 : Atomisation and dense spray (coordinator Dr. Julien Carmona)**
  - Diego Ferrando and F-X Demoulin, CORIA, France
  - Marcos Carreres, CMT, Spain
  - Ashoke De, Institute of Technology Kanpur, India
  - Yaquan SUN, University of Darmstadt, Germany
  - Julien Carmona and Vincent Moureau, CORIA, France

#### **Sydney Needle Spray Burner**

Coordinators: Dr. Gajendra Singh (IIT Mandi, India)

Prof. Assaad Masri (University of Sydney, Australia)

Expected contributions come from five groups: Two from IITK (India), one each from Magdeburg Uni (Germany), KAUST (Saudi Arabia) and from Univ Sydney (Australia).

#### **Cambridge Swirl Spray Flames**

Coordinators: Prof. Andrea Giusti (Imperial College, UK)

Prof. Epaminondas Mastorakos (Cambridge Univ., UK)

First, contributions on cases studied also in the previous TCS workshop are presented in a unified way. Next, details and challenges of a new Cambridge database will be presented.