

# DROPS, SPRAYS AND ATOMIZATION

Dates of the Workshop: 17<sup>th</sup> - 20<sup>th</sup> January, 2024

> Venue IIT Madras

#### MODE OF DELIVERY:

The participants will receive an electronic version of all presented lecture material. Ample time is allotted for Q&A following each lecture as well as for in-depth discussions with the lecturers.

#### **INTENDED AUDIENCE:**

This course is directed towards practicing engineers, researchers and graduate students involved in R&D and or working with systems involving the generations and application of drops and sprays. For those with little previous background, the course begins with fundamentals of atomization and proceeds through theoretical, experimental, numerical and application topics.

#### AIM OF THE COURSE:

This short course has the aim to present the current understanding and state of the art of atomization fundamentals, their realization in atomizer systems and their application in a wide variety of engineering branches, including spray drying, spray coating, spray cooling, fuel injection, etc. These aspects are first addressed theoretically in terms of hydrodynamic instabilities of liquid jets and sheets – primary atomization. This is followed by considerations about the break-up of single drop-lets – secondary atomization. These fundamentals are followed by topics on diagnostics, numerical simulations, drop/wall interactions and further advanced topics and applications.The program foresees discussions among the participants and the lecturers. The aim is to address on-going development and application problems suggested by the participants.

### No. of Participants: 60





Fees of the Workshop : Students, Postdoc, Faculty : Rs. 17,700/- (Rs.15,000 + 18% GST)

Industry: Rs. 29,500/- (Rs.25,000 + 18% GST)

## INSTRUCTORS (J)

**Prof. Shamit Bakshi** Dept. Mechanical Engineering, IIT Madras, India.

**Prof. Saptarshi Basu** Dept. Mechanical Engineering, IISc Bangalore, India

**Prof. Sanjeev Chandra** (online) Dept. Mechanical and Industrial Engineering, University of Toronto, Canada

**Dr. Philippe Leick** (online) Engineering Combustion System, Robert Bosch, GmbH, Stuttgart

**Prof. Marco Marengo** Distinguished Professor of Thermal Physics, University of Pavia, Italy

Prof. Mahesh Panchagnula Dept. Applied Mechanics, IIT Madras, India **Prof. R.V. Ravikrishna** Dept. Mechanical Engineering, IISc Bangalore, India

**Prof. Srikrishna Sahu** Dept. Mechanical Engineering, IIT Madras, India

**Prof. Satyanarayanan Seshadri** Dept. Applied Mechanics, IIT Madras, India

**Prof. Gaurav Tomar** Dept. Mechanical Engineering, IISc Bangalore, India

**Prof. Cameron Tropea** Mechanical Engineering, TU Darmstadt, Germany, Dept. Mechanical Engineering, IIT Madras, India



8:00	Registration
9:00	Welcome, Introductions, Overview of course (Tropea)
9:30	Techniques of Atomization: Overview of Atomizers and their Applications (Tropea)
10:30	Break
11:00	Stability of Liquid Jets and Sheets (Tropea)
12:00	Fundamentals of Atomization (Marengo)
13:00	Lunch
14:00	Breakup and Atomization Models (Marengo)
15:00	Secondary Breakup (Basu)
16:00	Close of first day



9:00	Spray Nozzle Design (Panchagnula)
10:00	Drop-Drop Collision (Bakshi)
11:00	Break
11:30	Drop/Wall Interaction (Tropea)
12:30	Lunch
14:00	Drop Impact onto Pools and Films (Marengo)
15:00	Heat and Mass Transfer from Drops (Basu)
16:00	Spray Drying and Powder Production (Bakshi)
17:00	Close of second day

DAY 5 COURSE SCHEDULE	Friday, January 19, 2024 Topic: Methodology and Applications I

9:00	Air-blast Atomizers (Panchagnula)
10:00	Liquid Jet in a Cross-Flow (Ravikrishna)
11:00	Break
11:30	Slinger/Rotary Atomization (Sahu)
12:30	Lunch
14:00	Spray Cooling (Shesadri)
15:00	Imaging Techniques (Leick)
16:00	Spray Painting (Chandra)
17:00	Close of third day



9:00	Fuel Injection (Ravikrishna)
10:00	Drop and Spray Combustion (Basu)
11:00	Break
11:30	Measurement of Drops and Sprays (Tropea)
12:30	Lunch
14:00	Numerical Simulation of Atomization (Tomar)
15:00	Spray Coating (Chandra)
16:00	Close of the course