Development and Application of Laser diagnostics for Multiphase Flows

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Overview

Multiphase flows are ubiquitous in nature as well as in engineering applications. The subject encompasses a vast field, a host of different technological contexts, a wide spectrum of different scales and a broad range of engineering disciplines. A persistent theme throughout the study of multiphase flows is the need to model and predict the detailed behaviour of those flows and the phenomena that they manifest. In order to evaluate existing theoretical models and gain insights into the complex inter-phase coupling mechanisms, detail measurements of individual phases are very important. The last few decades have seen significant advances in the research in multiphase flows as a result of the development of various laser diagnostics tools. The present course intends to give a developmental perspective on a wide range of optical diagnostics for multiphase flow studies and also demonstrate their application to variety of sectors, from combustion to process industry, and from liquid atomization to powder technology.

Objectives

The ultimate objective of the course is to help participants - scholars, faculty members (academia) and practitioners (industry) understand the physics of various laser based diagnostics, while appreciating the strength and limitations of each approach, and at the same time elucidate on the current challenges.

The course intends to inculcate skills for, not only, the efficient use of existing techniques, but also for the development of new techniques.

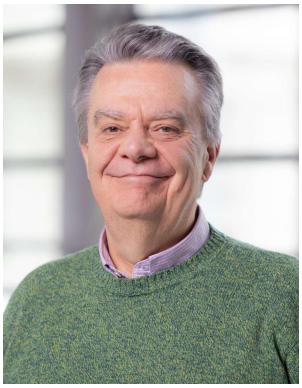
It aims to provide details on the principle of operation of point-, planar and volume- based techniques for characterizing spherical, as well as non-spherical particles and droplets. This will include the development of light scattering computations of the physics behind the laser techniques.

In parallel, the applications of the techniques will be demonstrated for various industrial processes, including atomisation and sprays, coal combustion and powder technology.

Separate lecture hours will be devoted to demonstrate recent advances in multiphase flow measurements.

Course Information	**Dates – 25th to 29th March 2024** **Development and Application of Laser diagnostics for Multiphase Flows**
Who Should Attend	Researchers and Academics working in Universities Product Managers, Development Engineers in Industry Development Engineers, Scientists in R&D Labs of Government Engineers working in Startups **Number of participants for the course will be limited to fifty.**
Fees	The participation fees for taking the course is as follows: **Participants from abroad : US $ 500** **Students : INR 1000** **Faculty : INR 2500** **Industry / Research Organizations : INR 10000** **Government Labs : INR 5000** The above fee includes all instructional materials, computer use for tutorials and assignments, laboratory equipment usage charges, 24 hr free internet facility. **Modes of payment:** Online transfer: Click here to pay: https://elearn.nptel.ac.in/gian/
Accommodation	The participants may be provided with hostel accommodation, depending on availability, on payment basis. Request for hostel accommodation may be submitted through the link: http://hosteldine.iitm.ac.in/iitmhostel/
Registration Procedure	Please follow the following steps for the registration: 1. Go to GIAN website (http://www.gian.iitkgp.ac.in/GREGN/index) First time users need to register and pay a one-time fee of INR 500 / 2. Enroll for the course: Metocean Science and Engineering. Once you enroll for the course, an Enrollment/Application number will be generated, and the course coordinators will be notified.

The Faculty



Yannis Hardalupas is a Professor of Multiphase Flows at Mechanical Engineering Department, Imperial College London in UK. His research group focuses on reducing emissions and increasing efficiency of gas- and liquid- fuelled land-based gas turbines, aeroengines, biomass boilers, internal combustion engines and liquid propellant rocket engines. Special focus is given to combustion of decarbonized fuels, including hydrogen, ammonia and e-fuels. His research also extends to chemical and food industry, including atomisation and sprays for spray drying and Cleaning-In-Place. Heat transfer research is also pursued with applications to cooling fusion and fission reactors, including the development of improved 'nanofluids' coolants and control of boiling processes. In addition to his contributions to the physics of combustion, heat and mass transfer and liquid atomisation and sprays, the development of novel optical and laser-based diagnostics led to patents for novel instruments on powder sizing, planar droplet sizing, nanoparticle sizing and novel imaging devices.

He is a Fellow of the Institute of Physics and Associate Fellow and member of the technical committee of Propellants and Combustion of the American Institute of Aeronautics and Astronautics. He chaired the Combustion Physics Group of the Institute of Physics, is an Editor of Experimental Thermal and Fluid Science and serves at the advisory and editorial boards of Experiments in Fluids and Int. J. of Spray and Combustion Dynamics.

Srikrishna Sahu is an Associate Professor in the Mechanical Engineering Department at the Indian Institute of Technology Madras, India. His expertise is in the areas of droplet and spray dynamics, particle - turbulence interaction, spray evaporation and combustion, liquid atomization spray-wall interaction and optical diagnostics. His group works on various technological projects e.g. atomization and spray characteristics of rotary injectors for small gas turbines, nanoslurry atomization, development of advanced water-washing system for gas turbine compressor cleaning, thermal desalination system. He is also a committee member of the Combustion Institute, Indian Section.

Course Co-ordinator

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