

Combustion and Flow Diagnostics

Overview

Flows with/without reactions are important in applications involving power and energy production. Experimental investigation of flows with reactions is unavoidable even with sophisticated computational solvers available presently, as there are several model parameters, which need to be experimentally determined. The results of computations also need to be experimentally verified. Advanced laser based diagnostics play an important role in current research scenario, giving minimal intrusion to the flow while extracting valuable information about it.

This course details the experimental methods that can be used to quantitatively measure various parameters in the reacting flows with non-intrusive diagnostics. The course starts with the basics of spectroscopy, which forms the basis for several of the diagnostics to be discussed here. It also gives an overview of lasers and cameras to be used for this purpose, and then details some common image processing methods that are used in the data reduction. Following this, there a large set of diagnostic techniques are introduced for analysing particulate matter in flow, sprays, concentration, velocity and temperature measurement in flows with/without reactions. Many practical aspects of these techniques are discussed along with example applications.

This course is useful to anyone working in experimental combustion and flow research. This course will help start new research ideas by young researchers, by equipping them with knowledge of all the diagnostics techniques.

Dates for the Course	26th September, 2016 to 7th October, 2016
Host Institute	IIT Madras
No. of Credits	2
Maximum No. of Participants	40
You Should Attend If...	<ul style="list-style-type: none">▪ You are a combustion engineer or research scientist interested in designing experiments involving combustion diagnostics▪ You are a combustion researcher who wants to understand the details of the experimental techniques in order to know their capabilities and limitations.▪ You are a student or faculty from an academic institution interested in learning how laser based diagnostics is done on various flows with or without reactions.
Course Registration Fees	<p>The participation fees for taking the course is as follows:</p> <p>Student Participants: Rs.2000 Faculty Participants: Rs.6000 Government Research Organization Participants: Rs.10000 Industry Participants: Rs.20000</p> <p>The above fee is towards participation in the course and the course material.</p> <p>Mode of payment: Demand draft in favour of “Registrar, IIT Madras” payable at Chennai. The demand draft is to be <u>sent to the Course Coordinators</u> at their address.</p>
Accommodation	<p>The participants may be provided with hostel accommodation, depending on the availability, on payment basis. Request for hostel accommodation may be submitted through the link: http://hosteldine.iitm.ac.in/iitmhostel</p>

Course Faculty



Dr. Andreas Dreizler, is a Professor of Mechanical Engineering in the Technische Universität Darmstadt, Germany. He received his PhD in Physical Chemistry from Universität Heidelberg in 1995. Andreas Dreizler was awarded Habilitation *venia legendi* Combustion Technology in 2002. He now heads the Institute for Reactive Flows and Diagnostics, which is embedded in the Department of Mechanical Engineering. He is the winner of Wilhelm Gottfried Leibniz-Award, received from German Research Foundation (DFG) during the year 2014. Andreas Dreizler has made a large number of substantial experimental contributions to understand turbulent combustion processes. Most recently, Dreizler designed novel experiments to track the time-place behaviour of three-dimensional turbulent flows. Dreizler's measuring methods and results are being used all over the world to improve models of combustion.



Dr. Satya Chakravarthy is a Professor of Aerospace Engineering in the Indian Institute of Technology, Madras. He received his PhD from Georgia Tech, Atlanta, USA, in 1995, and did his post doctoral research there for two years. He joined the faculty of IIT Madras Aerospace Department in 1997. He is coordinating the National Center for Combustion Research and Development (NCCRD), IIT Madras. He has won the YoungEngineer Award from INAE in 2003, Young Faculty Recognition Award from IITMadras in 2009, DRDO Academic Excellence Award in 2009, Dalmia-HEMSI-ACHREM Award in High Energy Materials in 2010. He has made some important contributions in the area of solid propellant combustion, partial premixed flames, and combustion instabilities. His research interests include advanced diagnostics in flows with sprays, combustion and acoustics.



Dr. T. M. Muruganandam is an Associate Professor of Aerospace Engineering in the Indian Institute of Technology, Madras. He received his PhD from Georgia Tech, Atlanta, USA, in 2006 and joined the faculty of IIT Madras Aerospace Department soon after. He has won the Young Faculty Recognition Award from IITMadras in 2015. His research interests include advanced diagnostics in combustion and high speed flows.

Course Coordinators

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