

**AICTE
SHORT TERM COURSE**

On

**Advanced Computational
Techniques for Fluid Dynamics:
Grid-Free and Immersed-Boundary
Methods with Applications
(ACTFD-19)**

November 25 - 30, 2019

Coordinators:

**Dr. Santanu Ghosh
Prof. K. Arul Prakash**

Sponsored by

All India Council for Technical Education



Organized by

**Department of Aerospace Engineering
&
Department of Applied Mechanics
Indian Institute of Technology Madras
Chennai - 600 036.**

• **OBJECTIVES AND SCOPE**

The course will focus on the development and application of mesh-free methods in CFD, with a special focus on immersed-boundary methods. The development and application of grid-free and immersed-boundary methods, which fall under the category of advanced techniques in CFD, is an active research area. These methods are being used to solve a wide range of problems that include aerospace applications to simulation of biological flows. The course will include a mixture of discussions on the theoretical foundations of the different grid-free methods, mode of implementation into existing CFD codes and varied applications. Formulation details of some established immersed-boundary methods will be discussed in the context of several application. Shortcomings and further scope of research in this technique will also be highlighted. The attendees are expected to get an insight about the approach to develop some new variant of grid-free/immersed-boundary methods.

• **COURSE CONTENTS**

- Basics of fluid mechanics
- Introduction to CFD: FDM, FVM and FEM
- Introduction and challenges in grid generation
- Grid-free methods: an overview
- Immersed-boundary method (IBM): evolution and classification
- Continuous- and discrete-forcing IBM
- Applications of IBM in flow control, heat transfer, and aerodynamics
- Surface stress estimation in IBM
- Future research and challenges in grid-free methods/IBM

• **FACULTY**

Faculty members of IIT Madras and guest members from other premier Institutions/ Organisations will deliver lectures.

• **COURSE MATERIAL**

Each registered participant will be provided access to a set of comprehensive lecture presentations and notes.

• **COURSE DURATION & VENUE**

The course is of one week (six days) duration from **November 25-30, 2019**. Classes will be held at the Seminar Hall, Aerospace Engineering Building, IIT Madras, Chennai-600036.

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Application Form

- **Name (block letter):**
- **Designation:**
- **Organization:**
- **Address for communication:**

Pin code: **Ph. No.:**
Fax No.: **E-mail:**

- **Highest Academic Qualification:**
- **Specialization:**
- **Experience (in years):**
(a) Teaching: (b) Industrial:
- **Amount of TA required as per entitlement mentioned in this brochure (only for AICTE approved college teachers):**
- **Accommodation:** Required / Not Required

(Local participants will not be provided accommodation)
All data provided are true to the best of my knowledge and belief. Kindly register me for the short term course on “Advanced Computational Techniques for Fluid Dynamics: Grid-Free and Immersed-Boundary Methods with Applications” to be held at IIT Madras.

Place: _____
Date: _____ Signature of the Applicant

SPONSORSHIP

Prof./Dr./Mr./Ms./Mrs./_____ is an employee of our institute and his/her application is hereby sponsored. The applicant will be permitted to attend the short-term course “Advanced Computational Techniques for Fluid Dynamics: Grid-Free and Immersed-Boundary Methods with Applications” at IIT Madras during November 25-30, 2019, if selected.

Date: _____
Signature of Sponsoring Authority
Designation: _____
Official Seal: _____

Provisionally selected candidates have to send a DD for Rs. 500/- as caution-money:

DD No. _____ Date: _____

Bank: _____

Amount: _____

Signature of the Applicant

The duly sponsored application form should be posted to:

Dr. Santanu Ghosh,
Assistant Professor
Dept. of Aerospace Engineering
IIT Madras, CHENNAI – 600 036
(or)
Prof. K. Arul Prakash
Professor
Dept. of Applied Mechanics
IIT Madras, CHENNAI – 600 036

E-mail: sghosh1@iitm.ac.in; arul@iitm.ac.in

Please mention ACTFD-19 in subject line

ELIGIBILITY

The course is open to faculty with background in Aerospace, Mechanical, Automobile, Civil, Chemical, Metallurgy, Ocean Engineering and Engg. Design from engineering colleges approved by AICTE. *No course fee* is charged for participants sponsored by AICTE approved institutions. However, Rs 500/- has to be sent by the provisionally selected participants as caution-money.

All payment is to be made by demand draft drawn on any nationalised bank in favour of **The Registrar, IIT Madras**, payable at Chennai.

FINANCIAL ASSISTANCE

Limited number of participants from AICTE recognised engineering institutions will be eligible for to and fro railway fare via shortest route in 3-Tier AC class and free lodging and boarding in the Institute guest house during course period. Candidates attending the full course only will be eligible for TA and DA.

BOARDING AND LODGING

Boarding and lodging facilities will be provided for the selected candidates from AICTE approved institutions in the Taramani guest house (TGH) at IIT Madras. Accommodation will be on twin-sharing basis.

IMPORTANT DATES AND LINKS

Last date for applications : **25-10-2019**
Intimation of selection (through email / FAX) : **01-11-2019**
Confirmation of participation : **11-11-2019**

Center for Continuing Education, IITM: <http://www.cce.iitm.ac.in/>

Department of Aerospace Engineering, IITM: <http://ae.iitm.ac.in>

Department of Applied Mechanics, IITM: <http://apm.iitm.ac.in/>

Course coordinators Profile:

Dr. Santanu Ghosh; <https://sites.google.com/site/iitmsgghosh/>

Prof. K. Arul Prakash; <https://home.iitm.ac.in/arulk>