



Academic Building, MNNIT



Administrative Building, MNNIT



New Yamuna Bridge at Allahabad



'Sangam' at Allahabad



ACFD-2014



ACFD-2014

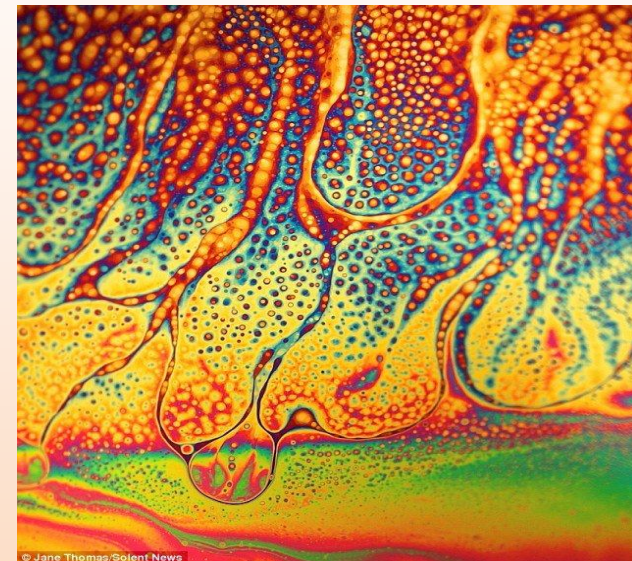
### Contact Details

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# International Workshop On Advances in Applications of Computational Fluid Dynamics (ACFD-2015)

August 12– 16 (Wed– Sun), 2015



Organized by



Department of Applied Mechanics  
 Motilal Nehru National Institute of  
 Technology Allahabad Allahabad- 211004, U.P., India

## Introduction

Computational Fluid Dynamics (CFD) is a tool being extensively used in research as well as in the industry for solving complex fluid flow and heat transfer problems. Simultaneous development of high performance computing (HPC) technology, numerical algorithms, physical and chemical models of flow physics, etc. are responsible for the big impact of CFD in solving both basic and applied scientific and engineering problems. In recent past, CFD has developed into a rich and diverse subject and has emerged as a major component of applied and basic fluid dynamic research along with theoretical and experimental studies. The use of CFD based simulation ranges from the analysis of the movement of microorganisms to the weather prediction. The leading manufactures, like automotive, aerospace, naval sectors frequently use this technique for the building of prototype and product development. The importance of CFD is continuously growing with time with the increasing capabilities of CFD and its applications. Recently, open source simulations software attracted so much attention because it is free of cost and flexible. However, using Open source CFD requires additional skill sets. The purpose of present workshop is to introduce the participants with CFD fundamentals, open source CFD and its advantages and limitation along with its use for solving a variety of problems.

## Scope of the Workshop

Department of Applied Mechanics (AMD), MNNIT Allahabad organizes an International Workshop on 'Advances in Applications of CFD' to develop human resource in the area of CFD. The workshop offers basic understanding of CFD simulation ranging from physics of the problem, transport equations, computational domain, grid generation, discretization, numerical techniques, validation and analysis of results to application of Open Source CFD to a variety of problems.

## Highlights of the Workshop

- Second edition of a popular course designed for the users of CFD.
- Delivered in most interactive and participative manner using the best pedagogical practices.
- Good for young teachers to improve their teaching skills, also. Methodical treatment connecting the Fluid Dynamics, its Mathematics and Computational software.

- Exposure to open source CFD software.
- Overview of present state-of-the-art of CFD and future scope of research and applications of CFD.
- Review at the end of each day.

## Takeaways/Outcomes

On completion of this workshop, the participants will be able

- To know the underlying principles of the CFD software options.
- To be able to understand the use of open source software.
- To be able to acquire additional skills required to use open source CFD.
- To know the possible applications and research areas.

## Venue

Seminar Room, AMD, MNNIT Allahabad.

## Who Should Attend this Workshop

This workshop is ideal for practicing engineers, faculty and research students who have basic background in either fluid dynamics or numerical methods and wish to use CFD to solve real life/research problems. The workshop is designed to make the participants learn from basics of CFD to the use of open source CFD to a variety of real life problems.

**Note:** The number of participants is limited to forty and will be selected on 'first come first serve' basis.

## Registration Fees

For students (certificate from institute is required): **Rs. 3000/-**  
For persons from academia and research organization: **Rs. 4000/-**  
For practicing engineers: **Rs. 5000/-**

Registration fee includes study material in a CD, breakfast, tea and working lunch for all five days of course. The registration fee does not include the accommodation and dinner charges. No T.A., D.A. will be paid to the participants for attending the workshop.

Registration fee can be sent in the form of demand draft (D.D.) in favour of "ACFD-2015" payable at Allahabad or can directly deposit through NEFT/RTGS to the designated account.



## Bank Details

**Account Name:** ACFD-2015.

**Account No.:** 718400301000174.

**Bank:** Vijaya Bank, MNNIT Branch, Allahabad-211004, U.P.

**IFSC Code:** VIJB0007184.

## Boarding and Lodging

The institute offers accommodation and dining facilities on payment basis at the Executive Development Centre (EDC), which is located in the MNNIT Staff Colony. It houses 24 A.C. rooms and a dining hall. Accommodation will be provided *first-come-first-serve basis* and depending on the availability.

A few guest rooms are also available in Boys' and Girls' hostels of the institute.

Click here for details: <http://www.mnnit.ac.in/index.php/facilities/edc>

## Resource Persons

- **Prof. Rakesh Mishra**, University of Huddersfield, U.K.  
<http://www.hud.ac.uk/ourstaff/profile/index.php?staffuid=sengrm>
- **Prof. Anuj Jain**, MNNIT Allahabad.  
[http://www.mnnit.ac.in/images/newstories/CV\\_Anuj\\_Jain.pdf](http://www.mnnit.ac.in/images/newstories/CV_Anuj_Jain.pdf)
- **Dr. Akshoy Ranjan Paul**, MNNIT Allahabad.  
[http://www.mnnit.ac.in/images/newstories/CV\\_A\\_R\\_Paul.pdf](http://www.mnnit.ac.in/images/newstories/CV_A_R_Paul.pdf)

## Fluids Engineering Research Group

Department of Applied Mechanics has a state-of-the art CFD facilities with one64-core IBM Blade-server, 14 high power workstations (HP Z-series) and 36 desktop computers of latest configurations and Ansys CFD software. The Fluids Engineering research group of the department is actively engaged in the teaching and research in the diversified fields in CFD at M.Tech. and Ph.D. levels and many research publications to their credit.

Three sponsored research projects are in progress in the area of flow control and Bio fluid dynamics. Two research scholars are awarded PhD recently and three more in progress currently in the area of CFD.

Current research interest of the group includes some of the frontier areas like aerospace, bio-fluid dynamics, vehicle aerodynamics, flow control, thermo-fluid dynamics, and turbomachines with active participation of students and professionals across academia and industries.

## About Department of Applied Mechanics

The Department of Applied Mechanics was established in 1964. It was initially named as "Department of Applied Mechanics, Hydraulic and Hydraulic Machines", which was renamed "Applied Mechanics Department" in 2003. The Department offers courses at undergraduate level on Solid Mechanics, Fluid Mechanics, Structural Analysis, Material Science, Engineering Mechanics, Mechanics of Deformable Solids, Kinematics of Mechanics, Dynamics of Machines, Computational Methods etc.

The department runs four Post Graduate (M.Tech.) programmes (i) Applied Mechanics, (ii) Material Science & Engineering, (iii) Fluids Engineering, and (iv) Biomedical Engineering. The department also offers Ph.D. programme in these areas. Currently 17 Research scholars are pursuing their Ph.D. The department has distinction of having its all faculty with Ph.D. degree. The committed faculty of the department is recognized for their quality teaching and research. The department has state-of-the-art facilities to carry out theoretical, computational and experimental studies. The department is recipient of DST FIST grant of Rs. 130 Lakhs in recent past. The department has MOUs with reputed universities abroad and industries in India. In 2014, the department celebrated its golden jubilee.

## About MNNIT Allahabad

**Motilal Nehru National Institute of Technology Allahabad** (MNNIT) is an institute with total commitment to quality and excellence in academic pursuits. It was established as one of the seventeen Regional Engineering Colleges (RECs) of India in the year 1961 as a joint enterprise of Government of India and Government of Uttar Pradesh, and was an associated college of University of Allahabad. With over 50 years of experience and achievements in the field of technical education, having traversed a long way, on June 26, 2002 MNREC was transformed into National Institute of Technology and Deemed University fully funded by Government of India.

With the enactment of National Institutes of Technology Act-2007, the institute has been granted the status of '**Institute of National Importance**' w.e.f. 15.08.2007 by the Act of Parliament.

The Institute now offers 9 B.Tech., 20 M.Tech. Degree Programmes (including part-time), MCA, MBA, M.Sc. (Mathematics and Scientific Computing) and Master of Social work (M.S.W.) programmes and also registers candidates for the Ph.D. degree. The Institute has been recognized by the Government of India as one of the centres for the Quality Improvement Programme (QIP) for M.Tech. and Ph.D. The institute offers congenial atmosphere for learning.

### About Allahabad and its Connectivity

Allahabad is well known throughout the country for its purity and cleanliness that the city has maintained for many years. It is a holy and religious place and the meeting point of three most pious rivers namely Ganga, Yamuna and the mythological Saraswati. The city has always been associated with well known political, cultural and academic personalities of the country which has aggrandized the glory of the city. The city better known as "PRAYAG" has many governmental institutions which include MNNIT, High Court of U.P., Allahabad University and famous tourist places like Sangam, Anand Bhawan, Narayani Ashram etc. Wide and clean roads with statues at regular squares form a part of the attraction of the city. And at last, MNNIT is the heart of the city and one of the best institutes which ensures Quality Education.

Allahabad city is situated in the northern part of India in the Awadh region of the state of Uttar Pradesh. It is well connected with flights, rail and road transport to other parts of India. Daily trains, buses and flights are available from major cities in India. Allahabad is the head quarters of north-central railway and is part of Howrah-Delhi grand chord rail network. It is well connected to all other important cities in India Allahabad has its own domestic airport at Bamrauli which is 15 km away from the heart of the city. Air link is available for New Delhi only. Air-connectivity to other parts of India is available from Lucknow (200 km) and Varanasi (135 km). Good road services are available in Allahabad. UPSRTC buses offer service to most of the cities in Uttar Pradesh. From Allahabad bus services are available to as far as Delhi (650 km) and Kolkata (800 km).

### Frequently Asked Questions (FAQ)

- **Will I earn a certificate for this course?**  
All 100% attendance is compulsory to earn a certificate. All the participants who attend the workshop in full will receive a 'Participation Certificate' signed by the Workshop Convener.
- **What resources will I need for this workshop?**  
Your curiosity! The rest will be provided by the organizers.
- **Do I need a scientific background?**  
The first two days of the workshop will focus on the fundamentals of CFD and the next three days on the using open source CFD software for a variety of problems. Any student or engineer who is having basic knowledge of fluid mechanics, heat transfer, computational/numerical methods and computer programming can participate in the workshop and learn a lot from it.

### Organizing Committee

**Patron:** Prof. P. Chakrabarti, Director, MNNIT Allahabad.

**Workshop Chair:** Prof. Anuj Jain.

**Workshop Convener:** Dr. Akshoy Ranjan Paul.

**Members:**

Prof. K.K. Shukla  
Dr. R.P. Tewari.  
Dr. S.J. Pawar.  
Dr. Ramesh Pandey.  
Dr. Abhishek Kumar.

Dr. Ajaya Bharti.  
Dr. Anindya Bhar.  
Dr. A.K. Upadhyay.  
Dr. V. Murari.  
Dr. Vivek K. Patel.



## Topics to be Covered

- Overview of CFD: Computational Methods, Transport Equations & BCs.
- Introduction to CFD Software: Geometry, Grid Generation, Solver, Post Processing.
- Diffusion / Conduction problems. Convection-diffusion problems.
- Pressure-Velocity coupling.
- Unsteady/Transient problems.
- Turbulence & Its Modeling.
- Multiphase Flow Modeling.
- Heat Transfer Modeling.
- Industrial Case Study.
- Overview of Open Source CFD.
- Open Source CFD Tool Box.
- Open Source Case Study.
- OpenFOAM Tutorial on Pipe Flow.
- OpenFOAM Tutorial on Turbomachines.
- OpenFOAM Tutorial on Heat Transfer.

