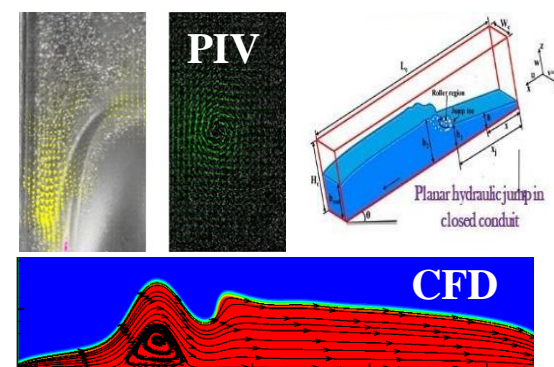




One-day workshop on Multiphase Flow - Research and Applications (MFRA-2023)

in Hybrid Mode
Sponsored by DST, SERB under SSR Scheme

Date: March 11, 2023



About the workshop

The workshop aims to discuss the scope and avenues of multiphase flow research in the present-day scenario. The scope has been ever-expanding with advancements in microfluidics, nano-fluidics, reacting flow systems, and process intensification. A comprehensive understanding of the physics of flow calls for a combined exercise of experimental, theoretical, and numerical studies. The workshop is designed to offer insights into emerging areas of multiphase flow through experimental techniques and numerical simulation.

About IIT Kharagpur



IIT Kharagpur was established in 1950 at the site of the Hijli Detention Camp in Kharagpur, West Bengal. The Institute started its academic program with only ten Departments (including Chemical Engineering Department), 224 freshers, and 42 teachers in August 1951. The first Director of the Institute was Sir J.C.Ghosh under whose able stewardship IIT grew in its formative years.

In the first convocation address of IIT Kharagpur in 1956, Pt. Jawaharlal Nehru had said –

“Here in the place of that Hijli Detention Camp stands the fine monument of India, representing India’s urges, India’s future in the making. This picture seems to me symbolical of the changes that are coming to India.”

Today, the Institute is a confluence of world-class multidisciplinary courses, cauldron of academic and corporate research, thriving hub of entrepreneurship, and facilitator for best-in-class placement. There are about 40 academic units, 11500 students, and 650 faculty members.

- Eligibility: Faculty members of different colleges/Institutes.
- Application through Google form - https://bit.ly/mfra2023_iitkgp
- Venue: Department of Chemical Engineering, IIT Kharagpur
- **Free Registration for all.**
- For any query, kindly mail at: mfra2023.iitkgp@gmail.com

Objective

Holistic approach to multiphase flow research through experiments and simulation

Overview

➤ Forenoon session - comprises lectures (tentative schedule detailed below) on different aspects of research on multiphase flow and allied areas.

While the first lecture offers a bird’s eye view of the emerging applications and scope of research, the subsequent talks will be focussed on more specific topics namely

- Multifluid modelling of a three-phase reactor, commonly encountered in process industries performing catalytic heterogeneous reactions
- Simulation methods for industry scale multiphase flow which includes the generalised approach to multiphase modelling along with discussions on basic CFD techniques followed by interface tracking methods, turbulent multiphase flow simulation in the context of industrial operations.
- Nanofluidic and Nanofluids in multiphase flow - discusses the perceived notion of phases as system scales in the order of molecular scales and the alterations – Use of nanoparticles to enhance transport properties in multiphase flow.

Each talk will be followed by an interactive session to discuss queries of participants.

➤ Afternoon session - Hands-on exposure to tools facilitating multiphase flow research.

- Live interactive session demonstrating the use of CFD software (COMSOL Multiphysics) for multiphase flow – Typical example of planar laminar hydraulic jump in open channel flow.
- Multiphase flow experiments using PIV (Particle image velocimetry) - Details of PIV measurements and simple flow experiments involving PIV

➤ Valedictory session - summary of the salient features and the take-home messages from the workshop.

Program schedule (Tentative)

Time	Topic	Speaker
9:00-10:00	Multiphase Flow – Current relevance and scope of research	Prof. Gargi Das
10:05-11:15	Multifluid modeling of a three-phase reactor	Prof. Arnab Atta
11:30-12:30	Simulation methods for industry scale multiphase flow	Prof. Somnath Roy
12:30-13:30	Application of Nanofluids and Nanofluidics in multiphase flow.	Prof. Chirodeep Bakli
Lunch break (13:30-14:30)		
14:30-15:45	Multiphase CFD simulation using COMSOL Multiphysics	Banashree Samanta
16:00-17:00	Demonstration of PIV in multiphase flow experiments	Ekta Tayal /Anirban Roy
17:00-17:30	Interaction/Valedictory Session	Prof. Gargi Das

Outcome

Establishing a forum for future research collaborations and interactions among faculty members of different affiliations, desirous to explore the hydrodynamics for reacting and non-reacting heterogeneous flow systems.

About us-

	Name	Research Interest	Webpage
Course Coordinator	Professor Gargi Das, Department of Chemical Engg.	Multiphase Flow, Transport phenomena, CFD, and Process intensification	http://www.iitkgp.ac.in/depart ment/CH/faculty/ch-gargi
Course Co-coordinator	Professor Chirodeep Bakli, School of Energy Science and Engg.	Thermal and Fluid sciences, Renewable energy, Microfluidics and Nanofluidics, Interfacial phenomena, Molecular Dynamics simulations, and Building Energy	http://www.iitkgp.ac.in/depart ment/ES/faculty/es-chirodeep
Course Instructor	Professor Arnab Atta, Department of Chemical Engg.	CFD, Single/Multiphase fluid dynamics, Microfluidics, and Computational nanostructures	http://www.iitkgp.ac.in/depart ment/CH/faculty/ch-arnab
Course Instructor	Professor Somnath Roy, Department of Mechanical Engg.	CFD, Low Re Aerodynamics, Heat Transfer, DNS and LES, Fluid Structure Interactions	http://www.iitkgp.ac.in/depart ment/ME/faculty/me-somnath.roy
Student Volunteer	Banashree Samanta, Department of Chemical Engg.	Multiphase Flow, CFD, Non-Newtonian fluid mechanics	
Student Volunteer	Ekta Tayal, Department of Chemical Engg.	Multiphase Flow, CFD, Non-Newtonian fluid mechanics	
Student Volunteer	Anirban Roy, School of Energy Science & Engg.	Multiphase Microfluidics, CFD.	

Important points -

- Last date for submitting the Google form - **3rd March 2023**.
- Link for joining the workshop in online mode to be provided at a later date.
- Certificate of participation can be downloaded from Google drive linked to mfra2023.iitkgp@gmail.com
- Participants attending the conference in person need to bear their travel and accommodation expenses.
- Accommodation can be arranged within the campus on a first come first serve basis based on availability.