Interfacial Transport Phenomena and Solution Techniques

Course Date: Jan 13 – Jan 17, 2023 (Offline Mode)

Overview

Interfaces play an important role in our daily life, and in the world around us. An *interface* is the boundary between two phases where the properties or behavior of one phase (e.g. fluid) differs from those of the adjoining phases (e.g. gas or solid). Interfacial engineering is a cross-disciplinary subject in which the scientists and engineers design and optimization of performance of new materials and processes. Recent developments in modern technologies which utilize high-performance, multifunctional materials involve new materials, composites and processes in which interfaces play a crucial role. Examples include nano- and micro-scale systems, micro-architected materials produced using subtractive or additive manufacturing, and materials that can withstand extreme environments. Applications include adhesives and coatings, adsorption and ion exchange, alloys, ceramics, fibers, plastics, and powder metallurgy, microelectronic fabrication and imaging processes, petroleum recovery and processing and other industrial applications. This short course will cover fundamental understanding of interfacial transport phenomena and introduce simulation techniques to model and predict the dynamics of interfaces in a variety of multi-material and multi-phase applications.

Course Information	**Duration: Jan 13 – Jan 17, 2023** (05 days) **Total Contact Hours:** 20 hours in 05 days **Number of participants for the course will be limited to fifty.** Course participants will learn these topics through lectures and interactive sessions.
Modules	**Module 1.** Fundamentals of Interfacial Dynamics **Module 2.** Solution techniques for flow problems with embedded interfaces **Module 3.** Immersed Boundary method, Diffuse Interface methods, Continuum surface force method **Module 4.** Sharp interface Methods, Ghost-Fluid Method **Module 5.** Fluid-structure interactions and applications
You Should Attend If…	• Executives, engineers and researchers from academia, industry and government organizations including R&D laboratories with a background in aerospace, automotive, mechanical, and chemical engineering. • Postgraduate students (MSc/MTech/PhD) and faculty from reputed academic institutions and technical institutions.
Fees	The participation fees (including taxes) for taking the course are as follows: **Faculty/Scientists/Industry Persons from abroad**: US $500 **Students from abroad**: US $100 **Private Industry**: INR 10,000 **Govt. Research Organizations**: INR 7,000 **Faculty**: INR 4000 **Students**: INR 2000 The above fee includes all instructional materials, computer use for tutorials, 24 hr free internet facility. The participants may be provided with single-bed accommodation on payment basis.

The Faculty

H. S. Udaykumar is a Professor in the Department of Mechanical Engineering, University of Iowa, USA. His research interests are Numerical techniques for moving boundary problems, high-speed multimaterial interactions, energetic materials, meso-scale modeling, machine learning, materials processing, biofluid mechanics, renewable energy systems, design of solar cookers with thermal storage.

Ashoke De is a Professor in the Department of Aerospace Engineering and having joint appointment in the Department of Sustainable Energy Engineering at Indian Institute of Technology, Kanpur. His research interests are CFD, High Speed Flows, Flow-Acoustics Coupling, Fluid-Structure Interaction & Energy Harvesting, Turbulence Modeling, Multiphase flows and Combustion.

Course Co-ordinator

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