Tata Institute of Fundamental Research
Survey No. 36/P, Gopanpally Village, Serilingampally, Ranga Reddy Dist., Hyderabad – 500 046

Webinar

Numerical studies of inertial particles in turbulence and buoyancy-driven bubbly flows

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Two-phase flows, consisting of particles or bubbles dispersed in the fluid, are widespread in nature and industries, e.g., aeolian process, bubble column reactors, boiling, volcanic eruption, clouds, etc. The presence of a dispersed phase can dramatically alter the fluid properties; for instance, bubbles in turbulent flow enhance mixing. In the absence of any dispersed medium, the turbulent kinetic energy spectrum has a universal scaling, $E(k) \sim k^{-5/3}$. This $-5/3$ scaling is because of the transfer of energy from large to small scales by the fluid inertia. The interaction of the dispersed phase with turbulence can alter the energy transfer mechanism. In this talk, we will discuss turbulence modulation due to its interaction with the dispersed phase. First, we will discuss the statistical properties of turbulence generated by a homogeneous swarm of buoyant bubbles rising in an otherwise quiescent liquid. Then we will discuss how the flow properties are modified due to the interaction of bubble swarm with a large-scale external stirring. In the final part of the talk, we will discuss the turbulence modulation in a particle-laden flow, where the size of the particle is smaller than the dissipation scale η.

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2:00 PM