



Falling Particles in Vortical Flows

In many natural phenomena or industrial applications, heavy particles are transported in complex flows. The flow structures may happen to promote the stirring and dispersion of the particles. But the opposite can also take place and the flow configuration may contribute to the focussing and accumulation of particles within specific regions of the flow. The objective of this work is to examine the interactions of particles with local spatial structures of the flow, i.e. large vortices. We consider particles falling under the action of gravity in a cellular flow field which is a simple model flow capturing key features of vortical effects on the particles. The experiment uses electroconvection to generate a two-dimensional array of controlled vortices. Experimental observations are compared to the predictions of point-particle simulations. We examine the motion of single spherical particles but also of clouds of particles to address the interplay between the multibody particle interactions and the interaction between the particles and the spatial structures of the flow.

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Élisabeth Guazzelli

Senior Researcher CNRS, Paris, France

Élisabeth Guazzelli, a French experimental physicist, specializes in fluid mechanics, suspensions of particles in liquids, and particle-laden flows. She is currently a research director at the French National Centre for Scientific Research (CNRS), affiliated with the Laboratoire Matière et Systèmes Complexes at the University Paris Cité. Guazzelli is editor of Journal of Fluid Mechanics Rapids, published by Cambridge University Press. She is a fellow of the American Physical Society (APS) and the European Mechanics Society (EUROMECH), was named a knight in the Legion of Honour (2012). She won the EUROMECH Fluid Mechanics Prize (2016), and the APS Fluid Dynamics Prize (2023)



11:00 AM, Jan 16th, 2024
Madhava Lecture Hall, ICTS

Tea at 10:45 AM

Transport:

9:15 AM IISc Gate - ICTS: TT-1

1:15 PM ICTS - IISc Gate: Mazda 2



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