INTERDISCIPLINARY CENTRE FOR ADVANCED MATERIALS SIMULATION

ICAMS Special Seminar

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NL

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Small and large droplets dynamics in turbulent flows

In this talk, we discuss the breakup of a droplet in a stationary homogeneous and isotropic turbulent flow. We consider droplets with the same density of the transporting fluid. The droplets and the fluid are numerically modelled by means of a multicomponent Lattice-Boltzmann-method.
The turbulent fluid is maintained through a large scale stirring force and the radius of stable droplets, for the parameters in our simulation, is larger than the Kolmogorov scale, which is characteristic for the onset of viscous dissipation in turbulent flows. Events of droplet deformation, break-up and aggregation are clearly visible in our simulations.
Within the present LB approach, droplet evolution can be studied from both an Eulerian and Lagrangian point of view.
The Kolmogorov-Hinze criteria for droplets break-up can be tested also by means of simulations with different viscosity contrast between the two components.

Toschi and Bodenschatz. Lagrangian properties of particles in Turbulence.
Ann. Rev. Fluid Mech. (2009) vol. 41 pp. 375-404.