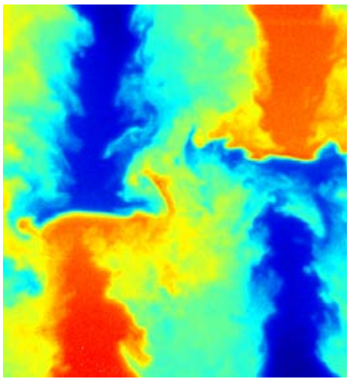
INSTITUT D' ÉTUDES SCIENTIFIQUES DE CARGESE

20130 Cargèse, Corse (France)

Small-scale turbulence: Theory, Phenomenology and Applications



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Organized by

Luminita Danaila, Alain Noullez, Philippe Petitjeans

Scientific Committee

Robert Antonia (Sciences Academy, Australia), **Jean-Pierre Bertoglio** (LMFA) ; **Luminita Danaila** (CORIA), **Rodney Fox** (Iowa State University), **Alain Noullez** (Observatoire de la Côte d'Azur), **Philippe Petitjeans** (ESPCI), **Michel Trinité** (CNRS)

Lecturers

F. Anselmet (Environmental problems), **R. A. Antonia** (Small-scale turbulence, channel flow), **C. Baudet** (Lagrangian turbulence, cryogenic flows), **J. Bec** (Turbulent suspensions), **C. Cambon** (Anisotropic turbulence), **M. Cencini** (Active and passive scalars), **P. Comte** (LES in shear flows), **F. X. Demoulin** (Two-phase flows), **R. Fox** (Reacting flows), **Y. Kaneda** (DNS at high Reynolds), **A. Lanotte** (2-D turbulence), **A. Pouquet** (MHD), **D. Pullin** (LES with stretched–vortex models), **A. Pumir** (Tetrad model), **B. Renou** (2-D measurements), **E. Villermaux** (Scalar mixing, liquid fragmentation)

Objectives: Understanding turbulence is a major goal for industrial and environmental applications: reducing noise and pollution, energy economy, optimisation of chemical reactors, better combustion efficiency etc. Because of the complexity of these applications, a reliable description and modelling of turbulent flows, especially at small scales, requires a precise description of turbulence, from a fundamental viewpoint.

Turbulent flows are known to contain a wide range of scales, each range being characterized by different phenomena. In many industrial processes, a particularly important role is played by small scales. They must be properly taken into account in sub-grid scale (SGS) models. An important example deals with modelling micromixing (chemical industry, combustion), in which the small scales are the most important factors. In this context, one fundamental question is: are the properties of these small scales universal? If so, under which conditions? If not, when? A particular attention has to be paid to the correct measurement of small-scale quantities, from either hot/cold wires or optical techniques, and these techniques will be reviewed in the school. Non-universality of the small-scale behaviour, closely related to small-scale anisotropy, can be recast and often explained in different contexts that will be presented: importance of local structures (rotation, strain, molecular diffusion), turbulence forcing (two-dimensional and atmospheric turbulence, strong rotation, stratification, magnetohydrodynamics,...), presence of droplets.

Special emphasis will also be given to the practical, environmental and industrial applications of the properties of small-scale turbulence.

http://gdr-turbulence.pmmh.espci.fr/Cargese/cargese-turbulence.html *e-mail:* turbulence@pmmh.espci.fr

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Directeur : Élisabeth Dubois-Violette, **Institut :** tél. : (33) 4 95 26 80 40 ou (33) 4 95 26 80 48, fax : (33) 4 95 26 80 45