Modeling of Turbulent Dispersed Flows

Doctoral Course - EPFL (Lausanne)

Instructor: Alfredo Soldati

Handouts:

Course syllabus in pdf format (30Kb)

Notes on diffusion into a falling film in pdf format (1.5Mb)
Notes on unsteady diffusion in pdf format (0.9Mb)
Notes on unsteady forces acting on particles in pdf format (1.2Mb)
Notes on calculation of forces over a sphere in pdf format (0.3Mb)

Introductory seminar in pdf format (0.2Mb)

Lessons 1 and 2 in pdf format (3.5Mb)


Lesson 3 in pdf format (2.6Mb)

Paper by Marchioli et al., Phys. Fluids (2008) in pdf format (0.4Mb)


Paper by Soldati, ZAMM (2005) in pdf format (3.4Mb)

Paper by Lumley and Yaglom, Flow Turb, Combustion (2001) in pdf format (0.25Mb)

Paper by Hussain, Phys. Fluids (1983) in pdf format (3.7Mb)

Lesson 4 (by Dr. Abdel Dehbi, PSI) in pdf format (1.2Mb)

Particles dispersion in synthetic turbulence in .avi format (27.6Mb)
Lesson 5 in pdf format (4.0Mb)
Paper by Sbrizzai et al., Flow Turb. Combustion (2008) in pdf format (1.5Mb)

Lesson 6 in pdf format (1Mb)
Prof. Serizawa: Reduction of wall friction with microbubbles, Tokyo (2005) in pdf format (0.5Mb)
Mechanism for microbubble transfer in the near-wall region of turbulent boundary layer (2005) in pdf format (4.2Mb)
Paper by Tomyama et al., Chem. Eng. Science (2002) in pdf format (0.5Mb)
Paper by Milenkovic et al., (Part 1), Int. J. Multiphase Flow (2007) in pdf format (0.9Mb)
Paper by Versluis et al., Science (2000) in pdf format (0.4Mb)

Multimedia

Dolphins-1. vc format (1Mb)
Dolphins-2. vc format (2.6Mb)
Dolphins-3. vc format (5.4Mb)
Human. vc format (0.7Mb)
Snapping shrimps (audio). mp3 format
Snapping shrimps-1. vc format (3.7Mb)
Snapping shrimps-2. vc format (7Mb)

Homeworks

1) Creeping flow around a sphere: computation of the forces
2) Diffusion into falling liquid film: computation of the rate of dispersion and the flux at the interface
Exercise 17.5-1 (pao 541). pdf format(1.5Mb)
3) Calculation of added mass and Basset force expression
Guidelines for added mass and Basset force calculation .pdf format(1.2Mb)

Final Assignment: Lagrangian particle tracking in cellular flow

Class notes in pdf format (1.7Mb)
Paper by Maxey, Physics of Fluids (1987) in pdf format (1.3Mb)
Paper by Marchioli et al., Physics of Fluids (2007) in pdf format (5.9Mb)
Tutorial on numerical methods for particle tracking in pdf format
Animation 1 (8.2 Mb): Aerosols (R=0) in cellular flow
Animation 2 (6.7 Mb): Bubbles (R=2) in cellular flow