PHYSIQUE DES ÉCOULEMENTS TURBULENTS

PHYSICS OF TURBULENT FLOWS

Lecturers: Christophe BAILLY, Christophe BOGEY

| Lecturers : 16.0 | TC : 0.0 | PW : 8.0 | Autonomy : 0.0 | Study : 4.0 | Project : 0.0 | Language : AN

Objectives

Physics of turbulent flows - The course covers various aspects of the physics of turbulent flows, with the aim to illustrate some recent results in a practical ways from experimental and numerical studies. The main objectives are the mastering of basic concepts (turbulence production, turbulence boundary layer, local equilibrium, role of vorticity, Kolmogorov's theory), the development of skill in turbulence modelling and in the analysis of results, and to provide also a comprehensive view of experimental and numerical approaches.

Keywords : Turbulence, Reynolds number, turbulent boundary layer, Kolmogorov's theory, vorticity dynamics, turbulence closure models

Programme

Main chapters of this course - Physics of turbulent flows - are
- Introduction to turbulent flows
- Statistical description
- Wall-bounded turbulent flows
(- Anatomy of a turbulence model)
- Dynamics of vorticity
- Homogeneous and isotropic turbulence, Kolmogorov's theory
- Numerical simulation (DNS, LES, RANS) and experimental techniques (HWA, LDA, PIV)

Learning outcomes

- Be able to describe and model classical turbulent flows (boundary layer, jets, wakes, homogeneous and isotropic turbulence)
- Be able to tackle the classical literature on turbulence

Independent study

Objectifs :

Méhodes :

Core texts

Bailly, C. & Comte-Bellot, G., *TURBULENCE (IN ENGLISH)*, Springer, ISBN 978-3-319-16159-4, 2015
Davidson, P. A *TURBULENCE*, Oxford University Press, Oxford, 2004
Pope, S.B.*TURBULENT FLOWS*, Cambridge University Press, Cambridge, 2000

Assessment

Final mark = 50% Knowledge + 50% Know-how

Knowledge = 80% homework assignements + 20% lab work