



FLUIDES ET ENERGIE - CONCEPTS ET APPLICATIONS

FLUIDS AND ENERGY - CONCEPTS AND APPLICATIONS

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| Lecturers : 22.0 | TC : 16.0 | PW : 4.0 | Autonomy : 8.0 | Study : 0.0 | Project : 0.0 | Language : MI

Objectives

This teaching component (AF) introduces the whole FLE (Fluids & Energy) teaching unit (UE) through a hands-on exploration of flow physics and presents next the key concepts of fluid mechanics and heat transfers

Keywords : Discovery of fluid mechanics, fundamental governing equations, simplifying frameworks

Programme

- Kinematics and fundamental laws
- Newtonian viscous fluid
- Reynolds number
- Flow regimes and flow features as a function of the Reynolds number
- Turbulent flows
- Energy, thermodynamics and compressible flows
- Vorticity and introduction to aerodynamics
- Heat transfer Mixtures

Learning outcomes

- Be able to describe the fundamental laws of fluid flows and heat transfers and their various levels of approximation.
- Be able to identify the main flow features and flow regimes.
- Be able to perform a dimensional analysis and an order of magnitude analysis for a boundary problem.
- Know the basics of continuous flux systems and head balances.

Independent study

Objectifs : Illustration of key concepts.
Training on report writing and result formatting.

Méthodes : 2 TD (2 x 2h) : Exercices
1 TP (2h) : Training document + 5-page laboratory report writing

Core texts

E. Guyon, J.-P. Hulin, L. Petit., *HYDRODYNAMIQUE PHYSIQUE.* , CNRS Editions, EDP Sciences., 2012
G. K. Batchelor *AN INTRODUCTION TO FLUID DYNAMICS.* , Cambridge University Press, 1967
C. Bailly & G. Comte-Bellot *TURBULENCE.*, Springer, 2015

Assessment

Final mark = 60% Knowledge + 40% Know-how
Knowledge = 100% final exam
Know-how = 100% continuous assessment