Computational fluid dynamics

Niveau d'étude
BAC +5

ECTS
3 crédits

Composante
UFR Sciences et Techniques

En bref

- **Langue(s) d'enseignement:** Français
- **Ouvert aux étudiants en échange:** Non

Présentation

Description

The computational fluid mechanics is an important tool need for study fluid and understand the fluid mechanics. Many topics are concerned by CFD going from weather forecast, aeronautics, and energy conversion. The use of CFD spread from basic engineering studies to advanced research which requires different skills. CFD is often used as a black box tool. In this course, we open this black box in order to describe the fundamental mathematical schemes and computational algorithms that compose CFD. The main topic of the course is the CFD basic methods. Three different chapters are provided to explain the specificities of CFD in particular cases concerned by energy process: two-phase flow, turbulence and combustion. This class provides to the future engineers and researchers the capabilities to understand how the numerical simulations works and also to be able to understand where its limits came from.

Objectifs

As specific objectives, by the end of the course students should be able to:

- Apply discrete finite volume schemes for simple equations.
- Develop a simple CFD code (e.g. incompressible 2D Cartesian code)
- Understand the main limitations and issues of CFD.
- Choose the right CFD methods for a given problem and quantify the different parameters (mesh, time step, …)

Pré-requis obligatoires

Knowledge on the following topics are mandatory:

- Fluid Dynamics basics (Navier-Stokes).
- Programming skills (Python recommended).
- Numerical analysis background (Explicit/Implicit Euler schemes, spatial discretization, …).
- Use of one CFD code (e.g. OpenFoam or Ansys).

Contrôle des connaissances

Contrôle continu + Épreuve terminale

Liste des enseignements

	Nature	CM	TD	TP	Crédits
Computational fluid dynamics	Matière				