AÉRODYNAMIQUE EXTERNE

EXTERNAL AERODYNAMICS

Lecturers: Jérôme BOUDET, Marc JACOB

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

Objectives

Lifting surfaces are used in aeronautics, but also for ground vehicles and energy production (wind). The aerodynamic design of these surfaces generally aims at optimizing the lift component of force, while minimizing drag. The objectives of the course are:
- Understand and model the forces (lift and drag) induced by the airflow on a body.
- Identify the associated parameters.
- Formulate and apply aerodynamic models.
- Estimate the accuracy of such models from a design perspective.

Keywords : Lift, Drag, Aeronautics, Automotive, Energy, Lifting Surfaces.

Programme

1. Flight dynamics.
2. Two-dimensional wing design. Potential flow and singularity methods.
3. Lift and 3D effects. Models: lifting-surface and lifting-line theories.
4. Drag control.
5. Compressibility effects.

Laboratory class: study of an aerofoil in a wind tunnel and comparison with numerical simulations.
Tutorial class: modelling exercises.
Tutorial class: geometrical design of an aerofoil with given specifications.

Learning outcomes

- Master the basic models of aerodynamics.
- Pre-design of lifting surfaces in aerodynamics.
- Understand the basic principles of aircraft flight.

Independent study

Objectifs : Completion of the laboratory and tutorial work.

Méhodes :

Core texts

E.L. Houghton , P.W. Carpenter, *AERODYNAMICS FOR ENGINEERING STUDENT*, Butterworth-Heinemann, 2003
D.P. Raymer *AIRCRAFT DESIGN: A CONCEPTUAL APPROACH*, AIAA, 2012
B.W. McCormick*AERODYNAMICS, AERONAUTICS AND FLIGHT MECHANICS*, Wiley, 1994

Assessment

Final mark = 55% Knowledge mark + 45% Know-how mark
Knowledge mark = 100% final exam
Know-how mark = 100% continuous assessment (laboratory and tutorial reports)