AÉRODYNAMIQUE EXTERNE

EXTERNAL AERODYNAMICS

Lecturers: Jérôme BOUDET, Julian SCOTT

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

Objectives

Understand and describe the forces (lift and drag) induced on a body by flow.
Identify the associated design parameters.
Formulate and apply flow models appropriate to aerodynamics.
Estimate the accuracy of predictions resulting from such models from a design perspective.

Keywords : Lift, Drag, Aeronautics, Vehicles, Lifting Surfaces.

Programme

1. Flight dynamics. Piloting and control surfaces. Longitudinal flight equilibrium. Flight stability.
2. Two-dimensional wing design. Essential elements of aerofoil theory. Thin aerofoil theory. Models: potential flow, panel methods.
3. Lift and 3D effects. Lift/circulation relationship and its consequences for 3D flow. Elliptic loading and its generalisation. Models: lifting-surface and lifting-line theories.
4. Drag control. Laminar and turbulent boundary layers. Parameters influencing transition. Components of drag on an aircraft.
5. Compressibility effects. Mach number, shock waves. Transonic and supersonic

Learning outcomes

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

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)