Aérodynamique

Component
École Nationale Supérieure d'Électrotechnique d'Électronique d'Informatique d'Hydraulique et des Télécommunications

In brief

> **Code:** NEHM3A

Presentation

Objectives

Introduce the main physical concepts and mathematical tools to adress both incompressible and compressible aerodynamics problems. By the end of this class, students will be able to model the flow around an airfoil and a wing, to evaluate the forces applied to a wing and to evaluate its global performance. They will also be aware of advantages and drawbacks of such theoretical models.

Description

- General introduction, terminology and nomenclature.

- How does an airplane generate lift?

- Linearized thin airfoil theory (2D) and effects of hypersustentation devices in incompressible subsonic flow.

- Direct problem (knowing the geometry of the profile, how to calculate the aerodynamic coefficients) and inverse problem (knowing the performance objectives in terms of aerodynamic coefficients, how to calculate the geometry of the profile).

-The lifting-line theory for the wings (3D) and the effect of the wing shape, aspect ratio and twist.

- Linearized theory (Prandtl-Glauert) around a profile (2D) for the compressible subsonic regime.

-The transonic regime.

- Linearized theory (Ackeret) around a profile (2D) for the supersonic regime.

- Recalls on the resolution of shocks / relaxations in the non-linear case.

Pre-requisites

"Basics" in Fluid Mechanics

"Basics" in Thermodynamics

Useful info

Place

> Toulouse