Specialization Aeronautics

GUIDAGE ET PILOTAGE

AERONAUTICS

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| Lecturers : 10 | TC : 0.0 | PW : 0.0 | Autonomy : 0.0 | Study : 10 | Project : 54 | Language : MI

Objectives

The development of unmanned flights (aerospace) has led to the development of powerful control methods adapted to the strong constraints of this field: multi-actuators multi-sensors with important performance requirements. These methods were very quickly deployed in the military aeronautics (reactivity) before massively broadcast in the civil aeronautics. With the reinforcement of competition, it is crucial to manage energy as efficiently as possible in order to limit costs while ensuring the comfort and safety of passengers, which makes control systems indispensable. The objective of this project is to train in the methods of design and validation (robustness) powerful control systems, essential in the aerospace industry.

Keywords : Automatic, Multi-actuator multi-sensor control (multivariable), Flight mechanics, Robustness

Programme

We can break down the work to be done in three phases:
A first step of bibliographic study in which it will be necessary to become familiar with some notions of dynamics of flight, to understand the model of lateral movement, to formalize the specifications for the design of the laws of control. A series of lectures will be dedicated to flight
mechanics.
A second stage of actual design correctors. Depending on the specifications, students are asked to choose from a set of multivariable methods (placement of poles, H-infinity, LQG, ...), a suitable method for the calculation of the corrector.

Learning outcomes

- Know how to formalize the specifications of a control system
- Know how to design a multivariable control algorithm answering a complete specification
- Know how to analyze the robustness of a control system
- Know how to apply the skills above on a civil transport plane

Independent study

Objectifs :

Méhodes :

Core texts

Daniel Alazard, Pierre Apkarian, Christelle Cumer, Gilles Ferreres, Michel Gauvrit, *ROBUSTESSE ET COMMANDE OPTIMALE*, Cépaduès éditions, 1999
A. E. Bryson *CONTROL OF AIRCRAFT AND SPACECRAFT*, Princeton University Press,, 1994
S. Skogestad and I. Postlethwaite*MULTIVARIABLE FEEDBACK CONTROL: ANALYSIS AND DESIGN*, Wiley- BlackWell, 2005

Assessment

Participation, written report and defense