RESEARCH MASTER INTERNSHIP

Department of Mathematics Computer and Automatic

Responsables du stage : Daniel ALAZARD et Caroline BERARD

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INTERNSHIP DESCRIPTION

Domain : ADIS : Automatic and Dynamic Systems

Title : **Satellite formation flying control: methodological and experimental approaches**

Description: In the field of the deep space exploratory missions (interferometric telescopes or antenna,…), most of future projects involve a cluster of satellites flying in formation with very strong relative or absolute pointing specifications. To reach such a level of accuracy, the satellites must instrumented with several stages of actuators and sensors (coarse pointing level, fine pointing level, …). The satellite formation have also to work according to various operating modes:

- leader-follower mode;
- reconfiguration mode to reach a new line of sight;
- safe mode,
- …

From the control design point of view, these specific features raise some problems:

- controller initialization and switching from different configurations of sensors and actuators and from different modes (absolute to relative attitude control mode commutation);
- transition between various control modes;
- implementation of such control laws on the onboard computer with autonomous mode management.

The goals of this internship is define and to launch the development of an experimental test-bed to illustrate all these topics. Today, the DMIA lab have already developed a set of identical experimental devices to illustrate satellite control law in the one degree of freedom case. The experimental test-bed to be developed will use 3 of these elements and will aim to illustrate control problems and to validate proposed solutions in the control of the formation.

This internship is the prolongation of previous works done in the department [1]. For the experimental test-bed development the candidate will benefit of the department technical team support.

[1] Closed-loop multivariable control of formation flying spacecraft.
PhD thesis ISAE. S. Gaulocher

30 % Theoretical Research	30 % Applied Research	40 % Experimental Research

Possibility to go on a Ph.D.: x **Oui** o Non

APPLICANT PROFILE

Duration: 5 or 6 months

Candidate profile: Master of Science in Aerospace engineering or equivalent

Location: ISAE/DMIA **(**Department of Mathematics, Computer science and Automatics)

Applications should be sent by e-mail to the supervisor.