



Institut Supérieur de l'Aéronautique et de l'Espace

## RESEARCH MASTER INTERNSHIP

Département d'Aérodynamique, Energétique et Propulsion

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### INTERNSHIP DESCRIPTION

Domain : Aerodynamics

Title : **ANALYSIS OF ROAD VEHICLE BEHAVIOUR IN TRANSIENT CROSSWIND. UNSTEADY FORCES MEASUREMENTS.**

Subject :

The aerodynamic characteristics of passenger vehicle and their evolution as a function of situations such as passing, crossing, or the presence of an unsteady gust of wind are factors in the vehicle's dynamic stability and driving security. The proposed study will contribute to the thematic of the department aiming to better understand the physics involved in these transient flows.

To reproduce an unsteady side wind in a wind tunnel, the department has developed a test bench consisting in submitting the model to a periodic movement in a steady wind. The realised tests clearly highlight transitional phenomena. The steady tests generally preceded by car constructors to characterise vehicle behaviour in yawing configurations appear then to not be sufficient.

To gain a better characterization of transitional effects, it is planned to proceed a dynamic measurement of the unsteady forces perceived by the model. A six components aerodynamic balance and accelerometers will be installed inside the model to perfectly identify its movements, to correct inertial forces and extract the resulting aerodynamic forces.

Analyses of the collected data should be consistent with the phase shifting effects observed in the velocity fields measured previously in the wake of the model. Effects of the model movement frequency will be discussed.

10 % Theoretical Research

30 % Applied Research

60 % Experimental Research

Possibility to go on a Ph.D.:

Yes

No

### APPLICANT PROFILE

Knowledge and required level:

Aérodynamique, mesures expérimentales

Outils: Matlab, Catia (connaissances de base)

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