



Institut Supérieur de l'Aéronautique et de l'Espace

RESEARCH MASTER INTERNSHIP

Département Aérodynamique, Energétique et Propulsion

Supervisor :

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INTERNSHIP DESCRIPTION

Domain : Internal Aerodynamics, Turbomachinery

Title : **STATIONARY VALIDATION, AND NON-STATIONARY ANALYSIS OF AN AXIAL FAN**

Turbomachine: The study focuses on an electric single-staged axial fan. This Turbomachine has been designed by Technofan Groupe SAFRAN for the A380, to extract the air of the cabin.

Topic :

The work of this study is expected to be 30% experimental, 70% CFD (100% CFD possible). The test bench, set up at DAEP/Jolimont is a high-power electric fan composed of a rotor and a stator. Some acoustic treatment can be considered, but will not be directly studied. A first work consists in pressure and velocity measurements, for global and local validation database constitution. The metrology is available (Five-hole probes, PT100 ...) and often used at the department. The second work consists in the numerical study. The simulation code used is FINE/Turbo (3D RANS for Turbomachinery). Geometries are provided at the beginning of the study. First, an exhaustive analysis of the stationary flows will be done on the full stage. Different operating points will be checked. The objective is to validate the design process used by Technofan, as well as the phenomenon by comparing experimental data and simulations. A careful choice of turbulence model will be needed. The simulations will give access to a complete operating line, from blockage to surge. Second, a classical time-depending approach will constitute a reference to evaluate the relevance of the harmonic method for non-stationary analysis. The rotor/stator interactions and secondary flows in clearances will then be studied.

Methods:

10 % Theoretical Research

60 % Applied Research

30 % Experimental Research

Possibility to go on a Ph.D.:

Yes

No

APPLICANT PROFILE

Knowledge and required level:

Aero-thermodynamics

Languages/Systems : Fortran, Unix

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