RESEARCH TOPICS

Title
Heat transfer, active thermal control and optimization of the turbine clearance.

Problem background
The gap between the rotating blade tip and the external case in an aircraft turbine is called clearance. Enhancing the thermal control systems of the engines in order to minimize the clearance is an important challenge in propulsion systems. The leakage through the clearance of a portion of the fuel gas is responsible, under the same fuel quantity, of a lower turbine efficiency. In this sense minimizing clearance means minimizing fuel consumption.

Research project objectives
The research program can be divided in four steps:

• in order to develop a numerical simulation of the phenomena that influence the clearance thermal control, the major interest parameters have to be shown.
• experimental tests will be performed by using a test rig under construction; a method to analyze the experimental results will be developed. This phase of the study will point out a standard method to perform the experiments and to analyze the obtained data;
• the experimental data analysis will allow to evaluate the behaviour of the critical parameters under different engine working conditions;
• this analysis will be the starting point for the following thermal active control optimization of the clearance.

Ph.D. Themes

• Thermal control and optimization of the turbine clearance.
• Numerical simulation of the turbine clearance behaviour in different turbine configurations and operative conditions.
• Design of an active thermal control system in order to optimize the turbine clearance.

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