Post-doctoral position at ISAE-Supaero,
Dpt. of Aerodynamics, Energetic and Propulsion

Large-Eddy Simulation of the flow through an aircraft vent panel

Context and objective

The aim of the project is to simulate a jet in cross flow configuration, with a particular interest for turbulence properties. The configuration is representative of a simplified vent panel, designed for aircraft doors, Fig. 1. The objective is to identify the main sources of losses and the role of turbulence. The design of a vent panel depends on several parameters:

- Mass flow delivered by the pressurization system and aircraft volume
- Pressure losses through the door system
- Position of the door on the aircraft fuselage
- Shape of the vent panel
- Aircraft speed and climb rate.

The present work will focus mainly on the two last parameters. Depending on the experience and will of the candidate, numerical simulations can be conducted through Navier-Stokes and/or Lattice-Boltzmann Method. As a mid-term application, this work will help designers to reduce the size and complexity of the door system, in a continuous effort to make aircraft more efficient. The main steps of this research program are 1) numerical simulation of a reference configuration, 2) study of the vent panel shape and 3) development of a simplified model.

(a) (b)

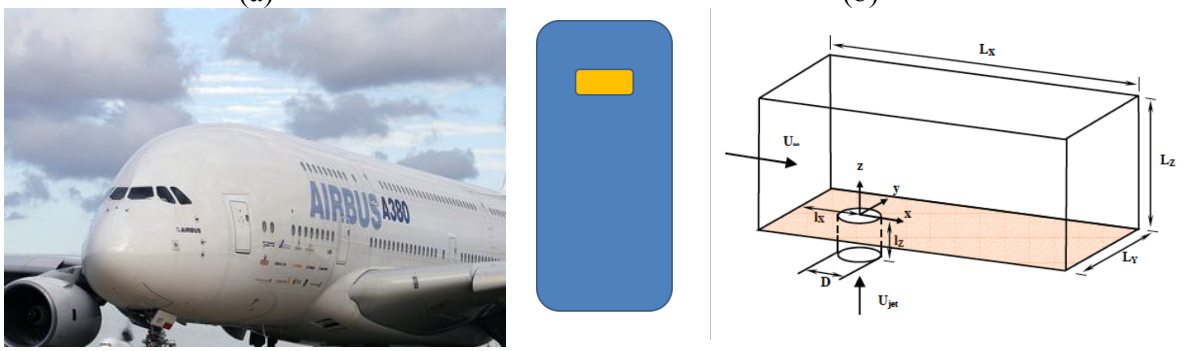

Fig. 1 (a) overview of the main door system in a typical long-range aircraft and (b) simplified geometry of the vent panel with jet in cross flow

Application and profile

Ideally, you have a PhD in fluid mechanics, with a background in Large-Eddy Simulation and turbulence. A good knowledge of industrial needs (aircraft systems manufacturers) and good capability to discuss with external partners are important assets (interactions with Latecoere are expected during the program). You already demonstrated a capability to publish in peer-review journals and to present your work in international conferences.
Please send your application to Nicolas.Gourdain@isae.fr, before March, 4th 2018.

Short Bibliography

[1] N. E. Daidzic and M. Simones. (2010). Aircraft decompression with installed cockpit security door. *J. of Aircraft*, 47(2)
[2] W. P. Jones and M. Wille. (1996). Large-Eddy Simulation of a plane jet in a cross flow. *Int. J. of Heat and Fluid Flow*, 17(3)
[3] J. Ziefle and L. Kleiser. (2009). Large-eddy simulation of a round jet in crossflow. *AIAA J.*, 47(5)