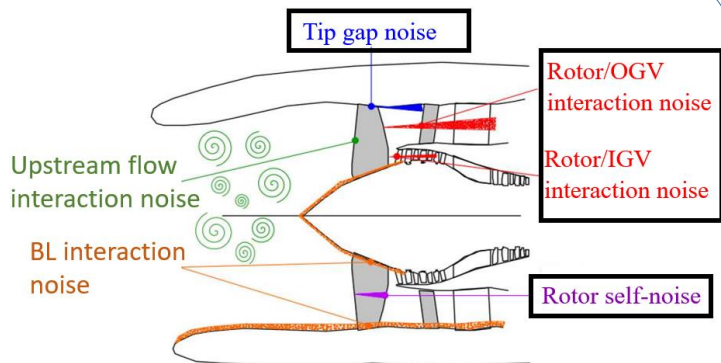


Fan/OGV broadband noise predictions using LES

Jean Al-Am, Vincent Clair, Alexis Giauque, Jérôme Boudet, Fernando Gea-Aguilera

1. Introduction

Noise from the fan stage of a turbofan engine, at approach conditions.



Objective

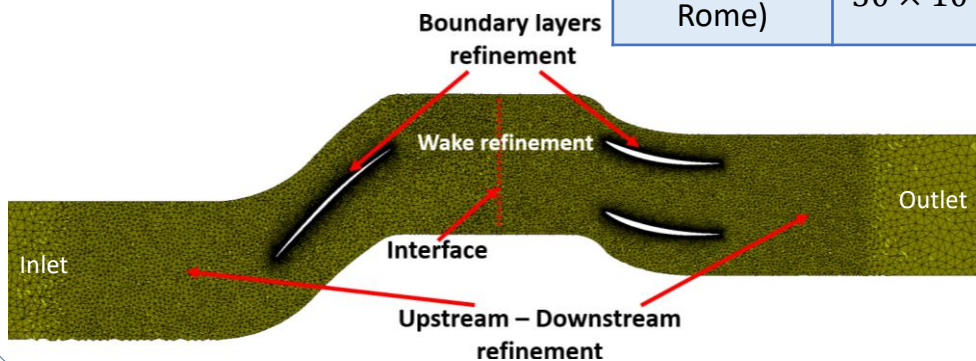
Direct prediction of fan noise using Large Eddy Simulations (LES).

2. LES setup

- Solver AVBP (Cerfacs).
- Periodic sector and full-stage (360°).



Nb. cells	1.5×10^9
Procs	15360
CPUh (Irène Rome)	30×10^6



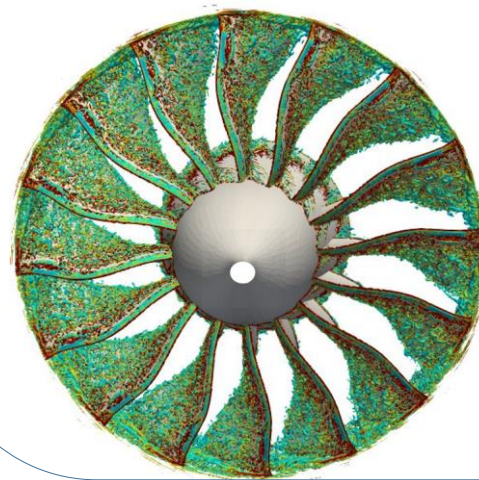
3. Aeroacoustic results

Main noise mechanisms:

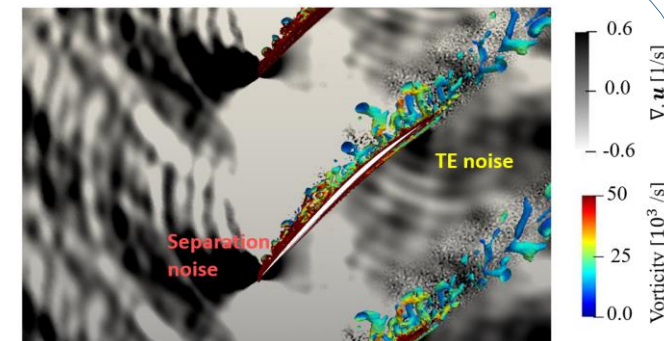
- Trailing edge noise.
- Separation noise.
- Rotor/stator interaction noise.
- Tip gap noise.

Full-Stage (360°) - non-periodic:

- All the cut-on propagating modes.
- Blade-to-blade correlations.

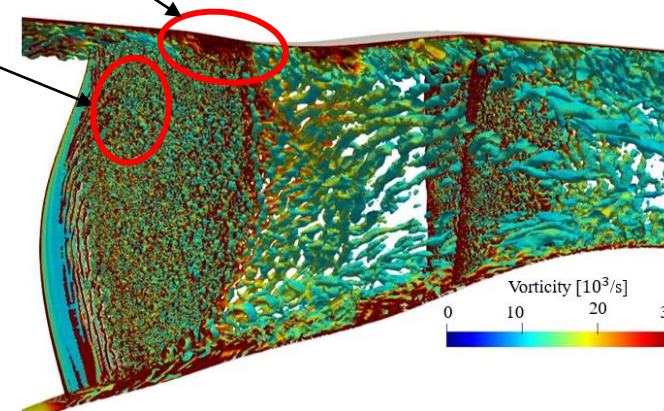


Periodic sector



Tip-leakage vortex

Bubble



4. Conclusions and Perspectives

- ✓ Fan noise mechanisms identified and under analysis.
- 💡 Convergence of the Full-Stage 360° LES.