TITRE : Comparative studies of the stability and sensitivity of a single and double stream jets

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Objectif du stage

The goal of the project is to continue the recent PhD work of Tobias Ansaldi in which the stability and the sensitivity of the single and double stream jet have been performed. These studies were based on the Parabolized Stability Equations and their adjoint counterpart. However numerous physical explanations and additional test cases are required to be able to propose a better physical understanding of the sound generation and propagation in jet. More specifically, the wave instability and the far-fied noise propagation are strongly related to the presence of shear layers and inflectional points in the mean flow. The far-field noise is determined by the FW-H acoustic analogy.

At the end of the project, some first ideas of noise control strategy have to be found.

Programme de recherche

1. Bibliography on : jet aeroacoustics, jet stability, sensitivity with adjoint
2. to compute stability of a single jet and of a double stream jet : Frequency dependence, influence of the inflectional points, problem of initialization (two instability mode in a double stream jet, exchange of stability)
3. to compute the sensitivity in the same condition, analysis of the results and with respect to stability properties
4. to perform a critical analysis and to propose some physical interpretations. Towards noise control strategies ...

Références


Compétences

Knowledges in fluid mechanics, hydrodynamic stability, shell, fortran, python and matlab languages are required. The trainee must be able to work with autonomy, to be motivated to read papers, to run/modify various codes in different languages and to be interested in physical interpretations.