

# Traineeship Proposal

**Title:** Numerical Study of the stability of inviscid sheared flows

**Company:**

Free Field Technologies (FFT) is based in Louvain-La-Neuve, very close to Brussels in the heart of Belgium. The main activity of FFT is the development of ACTRAN, family of simulation tools based on the finite element method and dedicated to the analysis of acoustics, vibro-acoustics and aero-acoustics. FFT also provides support, training and engineering services dealing with the use of ACTRAN. The company employs about 30 engineers.

**Objectives and Work Description:**

In the frame of his final year traineeship, the student will observe and understand the complex phenomena related to the stability of inviscid sheared flows. The study will be mainly numerical, but will strongly rely on theoretical results. The student will use the very new software of the Actran family based on the Linearized Euler Equations.

The first objective of the traineeship is to understand and predict the behavior (in particular in terms of stability) of small perturbations imposed to a complex flow field (shear effect, and with temperature gradients). Those predictions will have to be applied to a whole range of frequencies and types of excitation, of geometries, and of physical dimension of the computational domain (2D, axisymmetric, and 3D). Once those phenomena are analyzed and fully understood, new strategies of stabilization (or acceptance) of those instabilities will have to be set up, with the help of the development team.

**Student Profile:**

In last year of a master degree in mechanical engineering, the student must be a strong team player. A good knowledge of English and a strong interest in the simulation techniques are mandatory. A basic knowledge in acoustics, in numerical methods, in fluid mechanics (and stability theory) and in meshing environments is considered as an advantage.

**Keywords:** Aero-acoustics; simulation, finite elements, Euler equations, Kelvin-Helmholtz instabilities

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