

# FEASIBILITY STUDY OF AEROACOUSTIC MEASUREMENTS IN L1 WIND TUNNEL

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The decreasing number of aerodynamic experiments in aeronautics leads to find a use for large wind tunnels, such as the L1 facility at von Karman Institute. The growing interest for the acoustic problems provides an other application for these wind tunnels, namely low-cost aeroacoustic experiments.

A large number of difficulties must be overcome to use an aerodynamic wind tunnel to perform such measurements, particularly because of the numerous sources of unwanted noise. Several possibilities exist to get rid of this background noise, among which the use of highly directional measurement techniques. Two types of devices are used in this study : the acoustic mirror and the microphone array, that have the interest, besides the increase of the signal-to-noise ratio, to allow the localisation of the main sources of noise.

The microphone array technique being complex, the first part of the work is mainly numerical: Matlab programs are written in order to simulate the output of microphone arrays, using three types of algorithms. These programs are validated using test cases from literature and results of aeroacoustic computations.

An ellipsoid mirror and two microphone arrays are designed and manufactured. Moreover, specific acquisition chain (especially low-cost amplifiers-filters) and post-processing programs had to be designed. Different experiments are carried out to validate the measurement chain of the microphone array, using different types of sources: point sources without flow, point sources with flow, a wing profile in the flow. The results obtained show some slight problems, but allow globally validating the feasibility to perform aeroacoustic measurements in L1A.

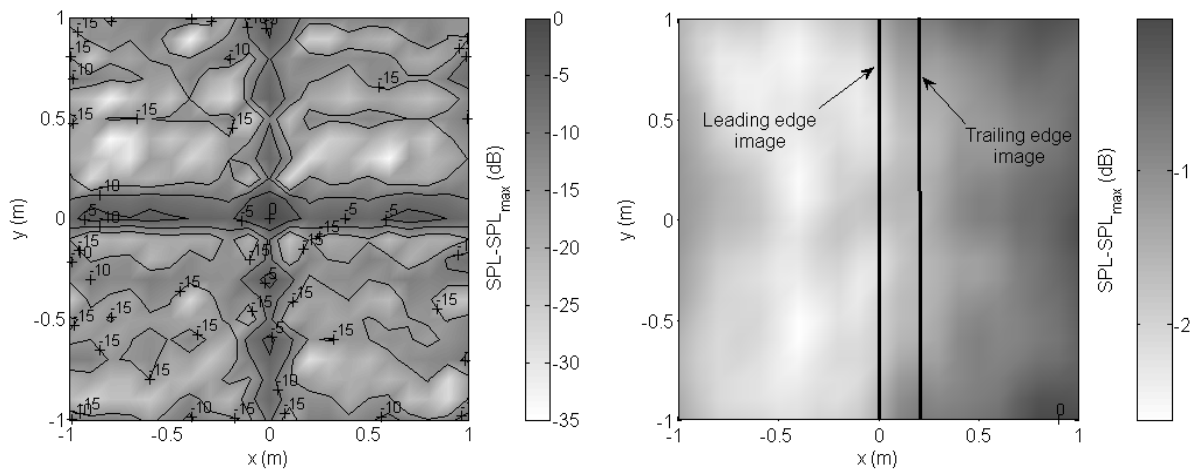


Figure 1: Result of a measurement using a point source at 4 kHz (left) and a wing profile (right)