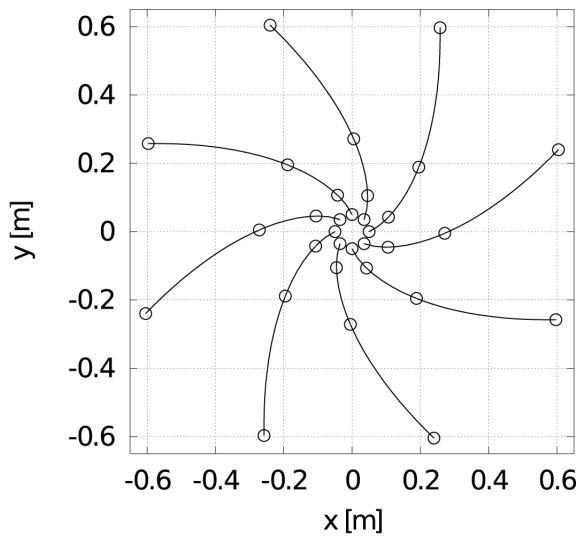


# BEAMFORMING DEVELOPMENT FOR OPEN-JET WIND TUNNEL CONGRURATION

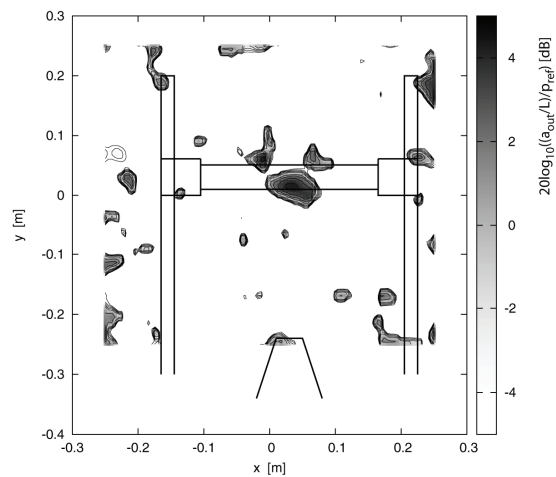
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The aim of this Diploma Course project is to improve the beamforming measurement configuration previously developed at the VKI. The beamforming method will be used for aeroacoustic source identification, in the VKI L1A open jet closed circuit wind tunnel. Following the conclusions and suggestion in the project report of Coatanea 2008 an array design is completed based on optimization methodology for the array response function and the new array configuration is build with 32 microphones. In order to obtain better resolution properties, a new beamforming algorithm called Generalized Inverse Beamformer is implemented. The algorithm is verified on synthetic test cases and good resolution and convergence behaviour are obtained. For the experimental verification of the algorithm a new measurement chain is build with a high performance acquisition board for 64 channels and the corresponding microphone amplifiers and filters. The calibration of the individual microphones is performed and the corrections are introduced to the beamforming algorithm. Several tests were made with the new array configuration and beamforming algorithm, in the anechoic room and also in the VKI L1A wind tunnel. These test showed the good resolution of the algorithm and the applicability of the new multiarm spiral array design at higher frequencies (checked up to 16kHz). The preliminary test measurements in the wind tunnel showed the capability of the algorithm to identify low level coherent acoustics sources. However, the preliminary efforts for the identification of the airfoil noise were not successful.



*Figure 1a: Optimized microphone array geometry*



*Figure 1b: Sourcemap at 12kHz for jet airfoil interaction noise in the anechoic room*