

Far-Field Acoustic Prediction of a Supersonic Expanding Jet Using Large Eddy Simulation

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Abstract : The hydrodynamic field generated by a jet expansion is computed via three dimensional compressible Large Eddy Simulation (LES). Finite Volume Method (FVM) will be the discretization used during this simulation as well as hybrid schemes based on Kinetic Energy Preserving (KEP) schemes and up-winding Godunov based schemes with instabilities detectors. Velocity and pressure fields will be stored at different surfaces near the jet, but far enough to enclose all the fluctuations, in order to use them as input for the acoustic solver. The acoustic field is obtained in the far-field region at several locations by means of a hybrid method based on Ffowcs-Williams and Hawkings (FWH) equation. This equation will be formulated in the spectral domain, via Fourier Transform of the acoustic sources, which are modeled from the results of the initial simulation. The obtained results will allow the study of the broadband noise generated as well as sound directivities.

Keywords : far-field noise, Ffowcs-Williams and Hawkings, finite volume method, large eddy simulation, jet noise

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