ACOUSTICS2008/2610
Direct Noise Computation in subsonic and transonic flows

Frédéric Daude[a], Thomas Emmert[a], Philippe Lafon[b], Fabien Crouzet[b] and Christophe Bailly[c]
[a]LaMSID UMR EDF/CNRS, 1 avenue du Général de Gaulle, 92141 Clamart, France
[b]EDF, 1, avenue du Général de Gaulle, 92141 Clamart, France
[c]Ecole Centrale de Lyon, 36, avenue Guy de Collongue, LMFA, 69134 Ecully, France

In order to model flow phenomena involving interactions between aerodynamics and acoustics, it is necessary to use Direct Noise Computation (DNC) instead of hybrid methods that are not suitable to take into account the feedback of acoustics on the flow. The methods that are now available in the field of Computational AeroAcoustics (CAA) allows to deal with DNC in realistic configurations. The numerical code SAFARI (Simulation of Aeroacoustics in Fluids And with Resonance and Interactions) has been developed for this goal. The set of equations are the compressible 3-D Navier-Stokes equations. High order finite difference schemes are used. Multidomain capabilities are implemented in order to deal with complex geometries. Block decomposition is used in order to take advantage of parallel processing on large clusters Validation cases are presented : diffraction by a cylinder, shock tube. Results on realistic configurations are also shown : ducted cavity, transonic sudden enlargment, airfoil interactions.