Influence of grid resolution and initial conditions on subsonic jets computed using Large-Eddy Simulation

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Abstract

Important progress has been made over the last years in computing high-speed jets by solving the compressible Navier-Stokes equations thanks to the use of accurate schemes and Large-Eddy Simulation (LES). LES of practical subsonic jets remains however difficult because of computational limitations and of the significant variations of jet characteristics with nozzle-exit conditions. These issues have recently been investigated in our team by performing LES of isothermal round jets at Mach number M=0.9 and Reynolds numbers Re about 100,000 using low-dissipation finite-difference methods [1] and a relaxation filtering as subgrid-scale model [2]. During the seminar, the strong influence of grid resolution and of jet initial conditions will be illustrated. The capacity of LES to compute initially turbulent tripped jets will first be examined by considering different grids containing from 50 to 250 million points [3]. Flow and acoustic fields obtained for peak nozzle-exit turbulence intensities of 0, 3, 6, 9 and 12 per cent will then be presented [4]. Finally, the sensitivity to Reynolds number for Re values between 25,000 and 200,000 will be shown [5].

References

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[5] Bogey et al., 2012, AIAA-2012-1172.