

LARGE-EDDY SIMULATIONS OF TURBULENT COMPRESSIBLE SUPERSONIC JET FLOWS USING DISCONTINUOUS GALERKIN METHODS

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The application of large-eddy simulation (LES) for solving turbulent jet flows is proving its capability to provide adequate results for aerodynamics, acoustics and heat transfer analysis. The research concerns LES of supersonic jet flows [1, 2] and the current work addresses an LES formulation based on the discontinuous Galerkin (DG) method [3], which allows high-order accuracy on unstructured meshes. Three large-eddy simulations of a compressible turbulent supersonic jet flow are performed. The baseline jet mesh with approximately 15×10^6 elements is simulated with 2nd and 3rd order accuracy and a refined mesh, with approximately 51×10^6 elements, is simulated with 2nd order accuracy. These simulations allow the independent assessment of polynomial and mesh refinements. The configuration is a perfectly expanded supersonic jet flow with Mach number 1.4 and Reynolds number 1.58×10^6 , based on the jet exit diameter. Preliminary results indicate that the baseline mesh with 3rd order accuracy is able to provide a good match with experimental data. The simulation of the refined mesh is still running. The simulations are performed to provide information about the capability of the DG method to accurately predict the jet flow and to assess the required level of refinement for this problem.

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