Turbulent Mixing Noise from Jet Exhaust Nozzles

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ABSTRACT

Understanding the complex turbulent mixing noise sources for jet exhaust nozzles is critical to delivering the next generation of "green" low-noise jet engines. High performance computing resources are used to develop/prove hi-fidelity direct-from-first-principles predictions of noise to characterize these hard to measure acoustic sources.

A scalable, compressible Large Eddy Simulation (LES) –based Computational Aeroacoustics (CAA) solver is used to study free-shear layer noise from jet exhaust nozzles, and boundary layer noise sources from airfoils. Representative wind turbine airfoils are simulated at realistic Reynolds & Mach numbers to mature CAA prediction accuracy. To prove design differentiation capability and hence readiness as an numerical rig ready to accelerate industrial design, the LES/large-scale HPC combination is being proven on a range of jet nozzle configurations.

Categories and Subject Descriptors

J.2 [**Computer Applications**]: Physical Sciences and Engineering— *Aerospace*; I.3.8 [**Computing Methodologies**]: Computer Graphics—*Applications*

General Terms

Documentation, Design.

Keywords

Large Eddy Simulation, Visualization, Modeling.

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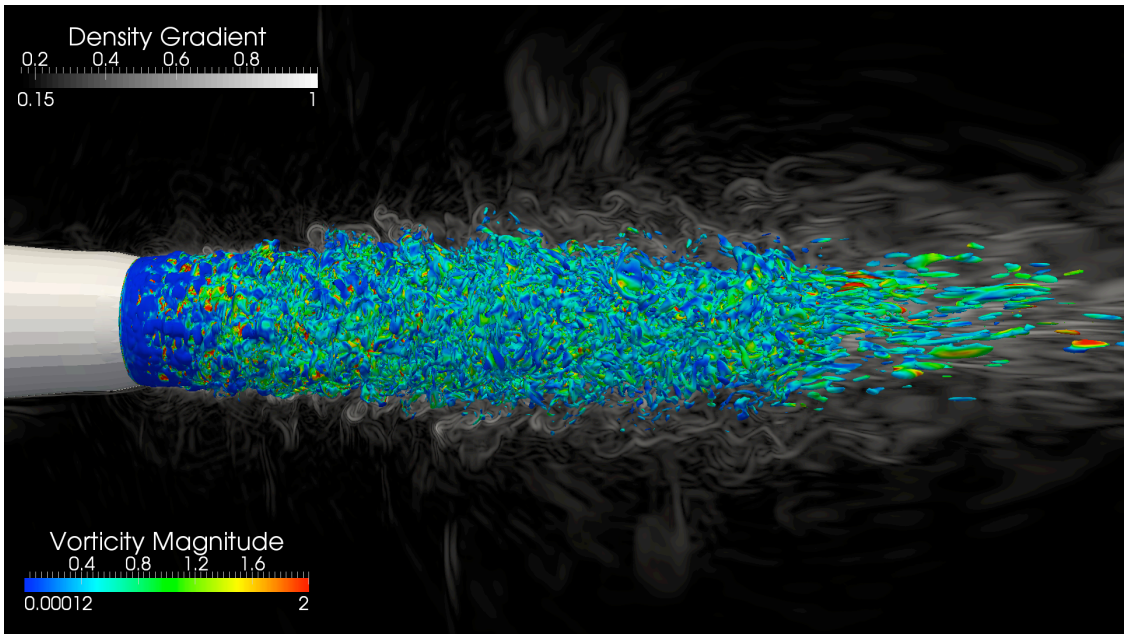

Figure 1: Turbulent structures in free shear layer flow from dual flow conic nozzle– Vorticity contours plotted on constant Q surface.

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