

Nearfield Anisotropic Mesh Adaptivity for the Third AIAA Sonic Boom Workshop

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The Third AIAA Sonic Boom Workshop provides a unique opportunity to verify nearfield Computational Fluid Dynamics (CFD) tools. The workshop gathered nearfield CFD pressures from families of Mach-aligned, manually-tailored meshes on the C608 Low Boom Flight Test Demonstrator and the shock-plume interaction wind tunnel model. Here two classical adaptive strategies, multiscale and goal-oriented, are compared to the results obtained on tailored grids. The multiscale strategy is implemented independently in two separate toolsets. Details of the adapted mesh density are shown that resolve the complex interaction of boundary layers, shocks, expansions, and vortical structures. Mesh convergence of nearfield pressure signatures and their integral is shown. These detailed comparisons between adapted and manually-tailored meshes and independent implementations of mesh adaptation demonstrate the readiness of these methods for controlling the discretization error of nearfield sonic boom predication.

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