Validation of Hybrid RANS/LES Model for Realistic Captive Carriage Geometries

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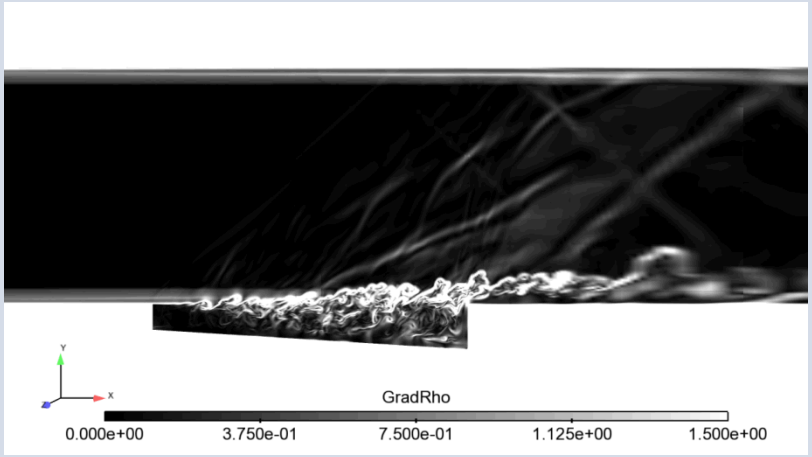
Tracking# (SAND, PR) _____

- **Problem:** High-fidelity models are used to predict complex aerodynamic loading environments for weapon-in-aircraft-bay scenario.
- **Objective**: Validate hybrid turbulence models against wind tunnel data for prediction of aerodynamic loads within realistic weapons bay geometries.
- **Impact**: Results provide estimates for model form error for captive carriage environments and guide R&D efforts for further quantifying and reducing these errors.

Principal Investigator / Lab: Matthew Barone, SNL
Code / Platform: SIGMA-CFD, Sequoia
Usage: 0.16 platform days
Program: ASC

Flow simulation of a cavity with ramped floor.



This image from a CFD simulation run on Sequoia shows the gradient of density for a supersonic flow past a cavity with a ramped floor. Simulations such as these allow engineers to quantify model form errors for predictions of aerodynamic environments in situations with complex geometric features, such as the ramped floor in this example.

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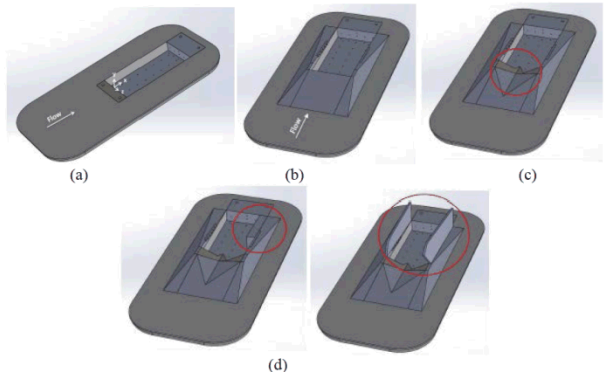
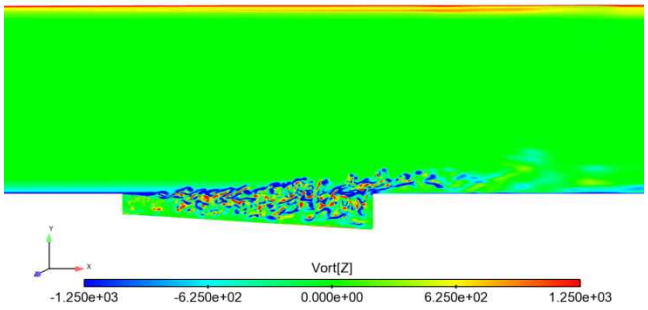
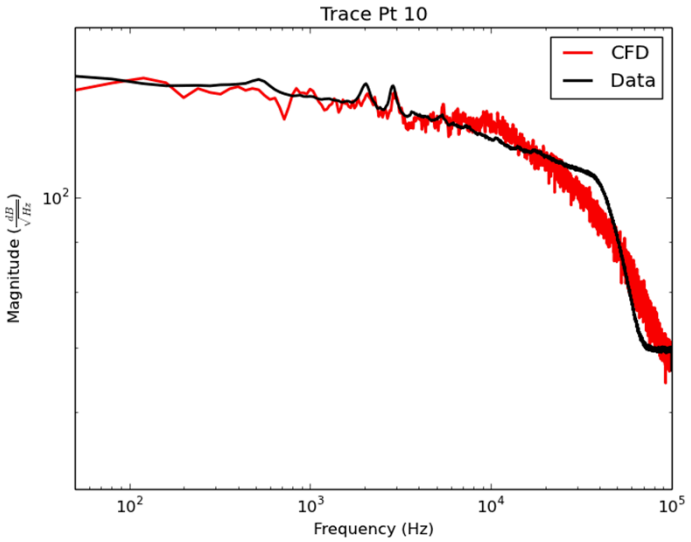
Simulation: Flow past various cavity configurations of interest





Quantity of Interest: Cavity floor pressure spectrum



Sequoia simulations allow for validation and model form error quantification for turbulence model approaches/