## Project 59E

# Moderate Fidelity Simulations for Efficient Modeling of Supersonic Aircraft Noise

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## Objective:

To develop and assess computational tools to simulate the flow and noise of Civil Supersonic Aircraft engines.

Develop tools requiring moderate computational resources and computation time

## Project Benefits:

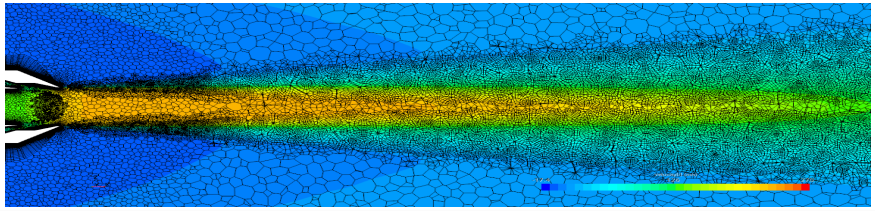
The developed tools will enable airframe and engine manufacturers to assess the noise impacts of engine design changes and to determine if particular designs will meet current or anticipated noise certification requirements

## Research Approach:

Perform steady and unsteady numerical simulations of the internal and external flow from dual-stream, subsonic and supersonic jet nozzles using a commercial CFD application (STARCCM+)

Predict the radiated noise using the Ffowcs Williams & Hawkings acoustic analogy and compare with experimental measurements

Supplement numerical simulations with low-order acoustic analogy, RANS-based noise predictions



## Major Accomplishments (to date):

Generated grid to resolve 80% of turbulence in LES simulation of dual-stream GT nozzle

Matched LES simulation flow with experimental flow and turbulence statistics provided by GA Tech

Conducted preliminary investigation into acoustic analogy models for noise radiation to large angles

## Future Work / Schedule:

Use Ffowcs Williams & Hawkings acoustic analogy to predict radiated noise

Perform coarse-mesh LES simulations for internal mixer nozzles to predict noise in peak directions

Use RANS and acoustic analogy to predict noise at larger angles to the jet axis

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