

ASCENT Project 59B

A059B – Experimental Supersonic Jet Noise Reduction

(Original Title: Jet Noise Modeling and Measurements to Support Reduced LTO Noise of Supersonic Aircraft Technology Development)



Georgia Institute of Technology

PI: Krish Ahuja (PI), D. Mavris and Jimmy Tai (Co-PIs)

Experimental support: Aharon Karon, Robert Funk, Nate Ramsey, and Reagan Mayo (GTRI)

Cost Share Partner: Gulfstream (POC: Brian Cook)

PM: Sandy Liu and Muni Majiqi

Research Approach:

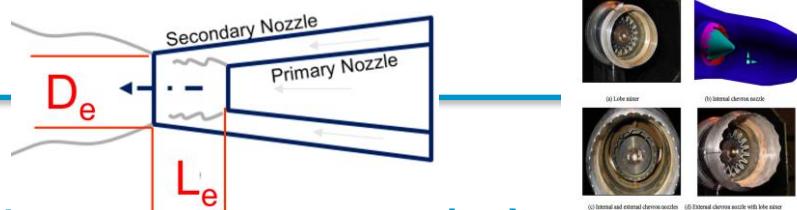
- Design and fabricate a simple model-scale test nozzle made of a round core primary nozzle buried in a coaxial secondary flow with the mixed flow exhausting some distance downstream of the primary nozzle exit.
 - Geometry was designed as a scaled model of a paper engine design
- Acquire acoustic and related flow measurements as a function of mixing distance between the primary nozzle exit and the final exhaust nozzle exit
- Provide the measured data to modeling teams for validation of prediction codes
- I suggest:
 - To simulate increased mixing relevant to realistic situations (Years 2 and 3), GTRI will be applying tabs/ chevrons to the primary nozzle.
 - Gulfstream will design and build a simple lobed mixer with a 2-in. equivalent diameter to represent a more realistic primary nozzle. (Current primary nozzle diameter is 1.6 in.)

Objective:

To acquire acoustic and flow measurements to be used by Project 59 jet noise modelers for the validation of low, medium, and high-fidelity jet noise prediction methods for supersonic transport applications (SST).

Project Benefits:

The validation of these prediction codes will give confidence in the noise prediction, which will aid in the design of low noise engines for reduced landing and takeoff noise of supersonic aircraft



Major Accomplishments (to date):

- The test nozzle designed and fabricated
- The model design shared with the modelers
- Acoustic measurements and unheated primary flow PIV of the simple geometry have been acquired
- All acoustic data and some PIV data have been disseminated to the modelling teams

Future Work / Schedule:

- Fix Flow facility after major structural failure
- Measure remaining acoustic and flow data
- Share all data with modelers and be available for interactions
- Experimental investigation on the effects of mixing produced by tabs attached to the primary nozzle and the resulting noise