

FAA CENTER OF EXCELLENCE FOR ALTERNATIVE JET FUELS & ENVIRONMENT

Analytical Methods for Expanding the AEDT Aircraft Fleet Database

Project 60

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Georgia Institute of Technology

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Objective:

Improve the accuracy of AEDT noise and emissions modeling for aircraft/engine combinations currently required to use “closest match” substitutions of aircraft/engine combinations fully supported by OEM data, i.e., Aircraft Noise and Performance (ANP) data by leveraging statistical learning techniques to meaningfully combine data from various sources.

Project Benefits:

- Development of a statistical learning-based methodology to improve noise and emissions modeling for engine/aircraft combinations with incomplete data
- Overall accuracy improvement to AEDT’s current representation of aircraft operations and fleet usage

Research Approach:

- Construct a superset database by combining existing robust public and proprietary aircraft datasets to collect config. and performance data for all AEDT aircraft a.k.a. **ANP Extension DB**
- Formulate and apply statistical learning methods to produce ANP and noise data for a down-selected list of representative aircraft types that are assumed “missing” from the **ANP Extension DB**
- Compare against high-fidelity data to validate the substitutions made by the statistical learning methods
- Expand and validate approach for generalized aircraft fleets (commercial/GA/military airlift, etc.)

Major Accomplishments (to date):

- Extensive literature review and inventory of available datasets; **ANP Extension DB** formatting complete
- Researched, down-selected, and tested appropriate machine learning-based analytical techniques to perform aircraft/engine substitutions

Future Work / Schedule:

- Continue refinement of the **ANP Extension DB**
- Improve the proposed analytical methods and apply them to larger datasets
- Validate the developed methods against high-fidelity data and develop ANP and noise data to expand the current FLEET database

Interfaces and Communications



- External
 - Weekly telecon with the AEDT development team
 - On-line communication via Team Foundation Server (TFS)
- Within ASCENT
 - Bi-weekly telecon with the FAA management
 - P54 (Takeoff/Climb Analysis), P43 (NPD+C), P10
- Contributors
 - Georgia Tech Team: Prof. Dimitri Mavris (PI), Dr. Michelle R. Kirby, Mr. David Anvid, Dr. Dushhyanth “DR” Rajaram, Mr. Ameya Behere
 - Graduate Students: Zhenyu Gao, Styliani Kampezidou, Cristian Puebla
 - FAA-AEE: Joseph DiPardo, Jeetendra Upadhyay
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