



# Project 084 Noise Modeling of Advanced Air Mobility Flight Vehicles

## Massachusetts Institute of Technology

### Project Lead Investigators

R. John Hansman

T. Wilson Professor of Aeronautics & Astronautics

Department of Aeronautics & Astronautics

Massachusetts Institute of Technology

Room 33-303

77 Massachusetts Ave

Cambridge, MA 02139

617-253-2271

[rjhans@mit.edu](mailto:rjhans@mit.edu)

Jacqueline Huynh

Assistant Professor of Mechanical and Aerospace Engineering

4212 Engineering Gateway

Irvine, CA 92697

949-824-3561

[huynhlj@uci.edu](mailto:huynhlj@uci.edu)

### University Participants

#### Massachusetts Institute of Technology (MIT)

- P.I.: Prof. R. John Hansman
- FAA Award Number: 13-C-AJFE-MIT, Amendment Nos. 112, 115, 131, and 143
- Period of Performance: January 1, 2023, to August 31, 2027
- Tasks:
  1. Identify target advanced air mobility (AAM) vehicle configurations for noise model development
  2. Identify noise modeling gaps for selected AAM configurations and operations
  3. Develop physics-based noise and flight profile model for representative AAM vehicles
  4. Incorporate noise results for representative AAM vehicles with the Aviation Environmental Design Tool (AEDT)
  5. Expand methods to additional vehicle sets
  6. Evaluate implications for noise mitigation and low-noise operations for AAM vehicles

#### University of California Irvine (UCI)

- P.I.: Prof. Jacqueline Huynh
- Award Number: MIT Subaward Purchase Order No. 883753
- Period of Performance: January 1, 2023, to September 30, 2026
- Tasks:
  1. Identify target AAM vehicle configurations for noise model development
  2. Identify noise modeling gaps for selected AAM configurations and operations
  3. Develop physics-based noise and flight profile model for representative AAM vehicles
  4. Incorporate noise results for representative AAM vehicles with the AEDT
  5. Expand methods to additional vehicle sets
  6. Evaluate implications for noise mitigation and low-noise operations for AAM vehicles



## Project Funding Level

The Federal Aviation Administration (FAA) provided \$615,000 in funding and \$615,000 matching funds were received. Sources for matching funds are approximately \$123,100 from MIT, and \$44,900 from subrecipient U.C. Irvine, and \$447,000 from Electra.aero, Inc (Electra).

## Investigation Team

### Massachusetts Institute of Technology

Prof. R. John Hansman (P.I.), Tasks 1–6  
Brandon Hadfield (graduate student), Tasks 1–6

### University of California Irvine

Prof. Jacqueline Huynh (P.I.), Tasks 1–6  
Victoria Pellerito (graduate student), Tasks 1–6  
Nathan Yeung (graduate student), Tasks 1–6

## Project Overview

This project develops first-principles noise models of urban air mobility (UAM) and AAM vehicle configurations to make community noise predictions of these aircraft flying at various operating states. Estimated noise levels from these models will be used to develop methods needed for a UAM/AAM-compatible the AEDT to make preliminary noise estimates of these vehicles. Conventional aircraft configuration noise levels at both the source and procedural levels have been examined extensively in projects such as ASCENT Projects 011, 023, and 044. This project aims to expand upon this work for UAM/AAM. Various vehicle configurations are currently under consideration for feasibility for use in UAM and AAM operations, including short takeoff and landing (STOL) configurations, tilt-rotor vertical takeoff and landing (VTOL), and lift-plus-cruise (LPC)-VTOL configurations, each of which has unique sources and operating modes. Thus, targets of opportunity are identified to estimate the noise levels and develop AEDT compatibility for these vehicles and operating modes. The work will be expanded to generalized AAM operations, and the models developed will be used to make preliminary noise footprint estimates for a variety of configurations. The goals of the project are thus to:

- Develop methods to model the noise levels at the source and due to different operations of UAM and AAM vehicle configurations.
- Develop methods needed for a UAM/AAM-compatible AEDT, to make preliminary noise estimates of AAM vehicles.

## Task 1 – Identify Target AAM Vehicle Configurations for Noise Model Development

Massachusetts Institute of Technology  
University of California Irvine

### Objective

The objective of this task is to determine target AAM vehicle configurations for development of the noise model. Various AAM configurations are under consideration in industry, such as STOL, as well as VTOL vehicles including tilt-rotor VTOLs. Various AAM vehicles across industry will be examined to determine which will be the most relevant for developing the noise modeling method. From this examination, one or more representative vehicles will be chosen as a focus in the initial noise modeling effort.

### Research Approach

- Research candidate AAM configurations currently being proposed by the top industry contenders, such as Joby Aviation,<sup>®</sup> Wisk Aero (Wisk<sup>®</sup>), and Electra.
- Gather specifications and representative flight profile definitions for selected representative vehicle configurations needed for noise model development.

<sup>®</sup> Joby Aviation is a registered trademark of Joby Aero, Inc., Santa Cruz, California.

<sup>®</sup> Wisk is a registered trademark of Wisk Aero, LLC, Mountain View, California.



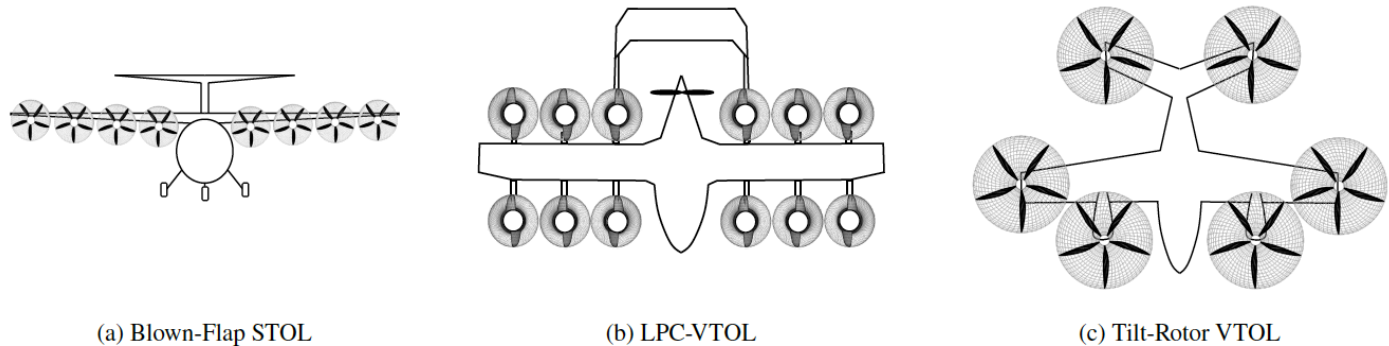


## Milestones

- Selected three vehicle configurations for noise model development.
- Determined the geometry and performance specifications for vehicle configurations for noise model development from published resources and from discussions with industry.

## Major Accomplishments

The research team identified three AAM vehicle configurations for the initial noise modeling development. In Figure 1, the vehicles examined include (a) a blown-flap STOL vehicle, (b) a lift-plus-cruise VTOL vehicle, and (c) a tilt-rotor VTOL vehicle.



**Figure 1.** Selected AAM vehicle configurations for noise model development: (a) blown-flap short takeoff and landing (STOL), (b) lift-plus-cruise vertical takeoff and landing (LPC-VTOL), (c) tilt-rotor VTOL.

For the purposes of modeling representative operations and noise models, an aircraft performance model that sizes and determines the off-design performance conditions of rotors for these vehicles was developed by using the XROTOR<sup>1</sup> blade element momentum model. Given design conditions such as the weight and required thrust of the representative vehicles, the ASCENT Project 084 team sized sample propellers for each of the vehicles to determine representative noise levels. For each of the vehicles selected, our team determined opportunities to obtain noise data for validation of the noise modeling done in Task 3. Electra provided data for the blown-flap STOL vehicle, Wisk provided data for the lift plus cruise vehicle, and published data from Joby Aviation were available for the tilt-rotor vehicle.

Depending on the type of vehicle, representative departure operations (Figure 2) and approach operations (Figure 3) for each were conceptualized.

<sup>1</sup> XROTOR is an interactive program for the design and analysis of ducted and free-tip propellers and windmills

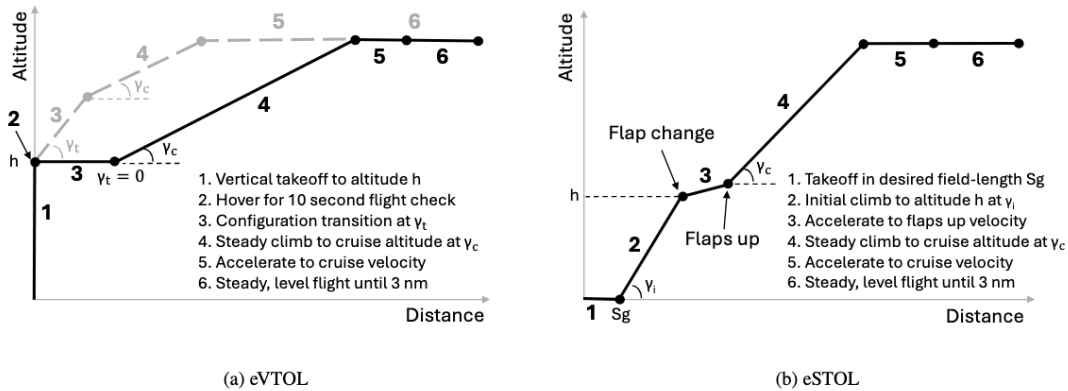


Figure 2. Example departure control strategy for electric vertical take-off and landing (eVTOL) and electric short take-off and landing (eSTOL) AAM aircraft.

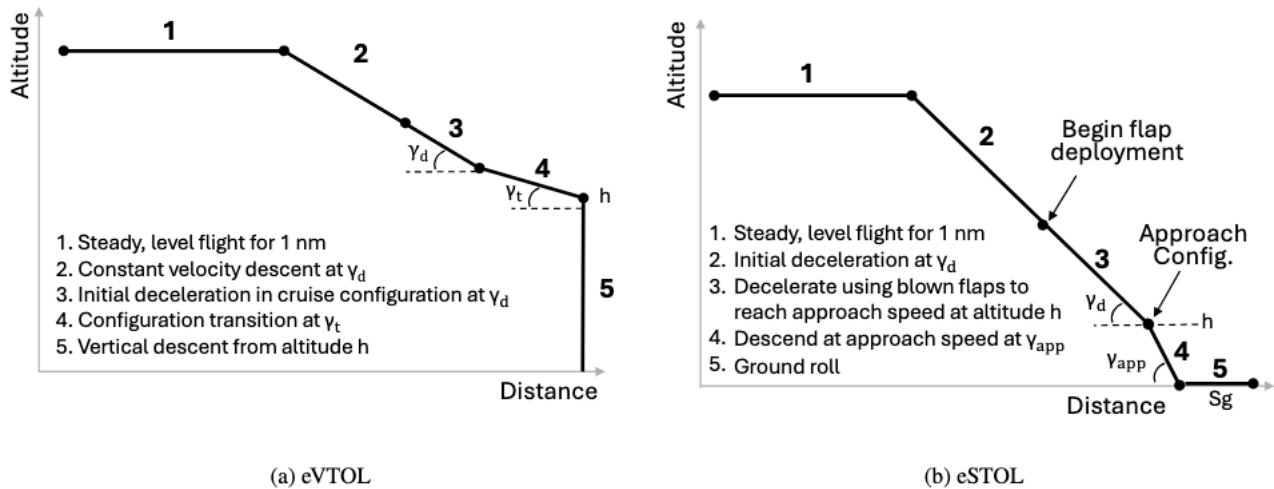


Figure 3. Example approach control strategy for electric vertical take-off and landing (eVTOL) and electric short take-off and landing (eSTOL) AAM aircraft.

### Publications

None.

### Outreach Efforts

- Presented at biannual ASCENT Advisory Board meetings.
- Presented the project to engineers at Wisk.
- Collaborated with Electra to gather noise data for a full scale blown-flap STOL aircraft.
- Collaborated with Wisk to receive sample noise data for a full-scale lift plus cruise aircraft.
- Participated in weekly teleconferences and meetings with FAA Technical Monitor.

### Awards

None.



## **Student Involvement**

Graduate students have been involved in all aspects of this research, in terms of analysis, documentation, and presentation. These students conducted the research in selecting vehicles, and defining the representative vehicles used for Tasks 2 and 3 of the research goals.

## **Plans for Next Period**

The primary objective for this task was met with the selection and development of specifications for representative vehicles to use for initial noise model development. As the project continues, opportunities to consider other vehicle configurations and flight procedures that will enrich the noise model development efforts will be considered, particularly via additional industry collaboration. Representative flight operations for each vehicle will continue to be analyzed.

## **Task 2 – Identify Noise Modeling Gaps for Selected AAM Configurations and Operations**

Massachusetts Institute of Technology  
University of California Irvine

### **Objective**

The objective of this task is to identify noise modeling gaps for selected AAM configurations and operations. According to the target AAM vehicle configuration to focus the noise model in effort on in Task 1, in Task 2, current gaps in noise modeling that must be addressed to formulate the noise modeling method for AAM vehicles will be identified. The noise modeling literature will be consulted, and the effort will leverage collaboration with the National Aeronautics and Space Administration (NASA) UAM and AAM work as appropriate. Noise sources most likely to dominate for different configurations and operations will also be identified. The task will focus primarily on the target vehicles identified Task 1, while considering additional gaps for other vehicle configurations on an ongoing basis.

### **Research Approach**

- Examine the configurations and potential operating procedures of the AAM vehicles determined in Task 1 via performance modeling and consultation with industry.
- Research potential noise sources from the AAM vehicles and determine modeling approaches of the current state-of-the-art noise models.

### **Milestones**

- Identified specific cases for the tilt-VTOL vehicle where noise modeling gaps are influential in predicted noise.
- Examined potential noise modeling operations for each of the three vehicle configurations from Task 1.
- Identified gaps in noise modeling, according to the three vehicle configurations from Task 1.

### **Major Accomplishments**

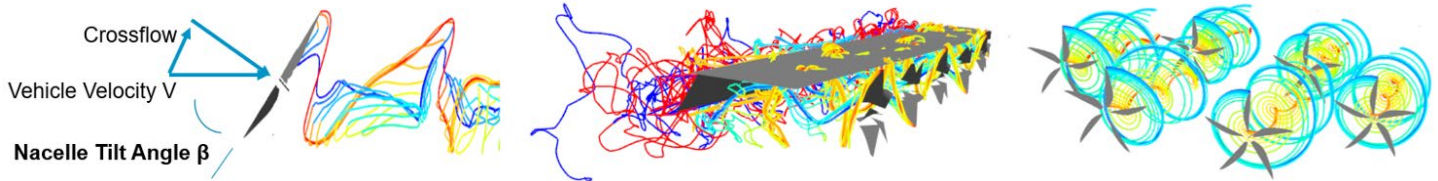
The AAM vehicles examined in Task 1 feature unique sources of noise stemming from different numbers of rotors and their placements, which interact with one another and with the airframe. These features were examined during this task, and the noise levels the ASCENT Project 084 team modeled in Task 3 were compared to the available noise data from industry. The tilt-VTOL vehicle's noise directivity changes with the tilt of the rotor; the LPC vehicle has varied rotor sizes; and the blown-flap STOL vehicle features noise levels arising from the blown lift. The operating procedures for each of these vehicles also varies and must be considered in the noise modeling. For example, the tilt-VTOL vehicle and LPC vehicle can operate in both vertical and forward flight conditions and must feature transition modes. In addition, the blown-flap STOL vehicle has different flight path angles depending on the flap setting and amount of blowing, thus making the flight profile and produced noise levels a coupled system.

For each of the vehicles, noise was modeled in Task 3 and compared to the available data for each of these vehicles as described in the accomplishments for Task 1. The results indicate that modeling noise using a simple uniform inflow model results in reasonably close results compared to the validation data (within 1-3 dB) for steady state conditions for the tilt rotor, lift plus cruise, and STOL vehicle. Furthermore, the noise output of the tilt-VTOL vehicle is found to be particularly sensitive to the powerplant condition during transition. Given that standard noise modeling tools like the AEDT are suited for a helicopter or traditional airplane models, but not something in between, this represents a notable gap.



This gap has motivated deeper investigation into the loading of each of the rotors during conditions with cross flow or potential rotor-wake interactions which is described in more detail in the accomplishments for Task 3.

Multiple non-axial inflow conditions were identified based on the flight profiles created for the vehicles described in Task 1. These are summarized in the following three main effects: crossflow, rotor-wake interaction, and rotor-wing interaction (Figure 4). Crossflow describes a non-axial velocity component that occurs when the inflow velocity vector is not normal to the disk plane of the propulsor. This velocity component cyclically alters the effective angles of attack, affecting flow separation, thrust, and potentially creating higher noise levels due to unsteady blade loading. This phenomenon primarily affects the tilt-VTOL and LPC vehicles during the transition segments between vertical and horizontal flight. Rotor-Rotor interaction describes effects of a forward propulsor’s wake on the inflow of a rear propulsor. This phenomenon potentially increases the overall propulsor noise through unsteady loading and turbulent inflow of rear propellers and is affects the tilt-VTOL and LPC vehicles due to the overlapping propulsor wake during forward flight. Rotor-Wing interaction describes the change in propulsor inflow due to a propeller in the nearfield of the wing. The presence of a wing has the possibility of affecting the potential field of the upstream propulsor, the propulsor affecting the potential field of the wing, and the turbulent wake of the propulsor creating viscous interactions with the wing. This phenomenon has the potential to increase noise primarily affects the blown-flap STOL vehicle.



**Figure 4.** Illustration flow filaments in conditions of non-axial crossflow, rotor-wing interaction, and rotor-wake interaction (left to right).

### **Publications**

None.

### **Outreach Efforts**

- Presented at the biannual ASCENT Advisory Board meetings.
- Collaborated with Wisk to understand the noise profile of their new V6 vehicle.
- Participated in weekly teleconferences and meetings with FAA Technical Monitor.

### **Awards**

None.

### **Student Involvement**

Graduate students have been involved in all aspects of this research, in terms of analysis, documentation, and presentation. These students conducted the research in determining noise modeling gaps for Task 3 of the research goals.

### **Plans for Next Period**

As the project continues, our team will continue seeking industry collaboration opportunities to share concepts for AAM vehicle flight operations. As we examine additional vehicles of interest for the project, gaps in noise modeling and operation design will continue to be documented.



## Task 3 – Develop Physics-Based Noise and Flight Profile Model for Representative AAM Vehicles

Massachusetts Institute of Technology  
University of California Irvine

### Objective

The objective of this task is to develop a physics-based noise and flight profile model for representative AAM vehicles. A first-principles modeling method for the flight profiles and noise of the target AAM vehicle configurations identified in Tasks 1 and 2 will be developed, with the ability to make community noise predictions for these aircraft flying at different operating states. Component-based noise models for the key sources identified in Tasks 1 and 2 will be developed primarily from the methods in the NASA Aircraft Noise Prediction Program 2 (ANOPP2). As data become available, the noise source models will be validated. More complex sources, such as propulsion-airframe interaction noise, may be modeled with external computational fluid dynamics tools such as Comprehensive Hierarchical Aeromechanics Rotorcraft Model (CHARM), and the results will be incorporated into ANOPP2 as needed. In addition, a first-principles flight profile generator applicable to the target AAM vehicle configuration from Tasks 1 and 2 will be developed and incorporated into the noise model. Noise at a variety of velocities, flight path angles, and operating modes will be estimated to construct noise-operation mode-distance curves to adapt the data to the AEDT. In this process, the operational drivers with the greatest impact on varying the vehicle noise levels will be identified, to determine which modes should be focused on when forming the curves. The potential to expand the noise modeling to other vehicle configurations will be considered on an ongoing basis.

### Research Approach

- Develop a method to model the noise of flight operations of representative AAM vehicles.
- Use methods to generate noise-operation mode-distance curves to adapt noise results on the AEDT to determine operational drivers with the greatest impact.

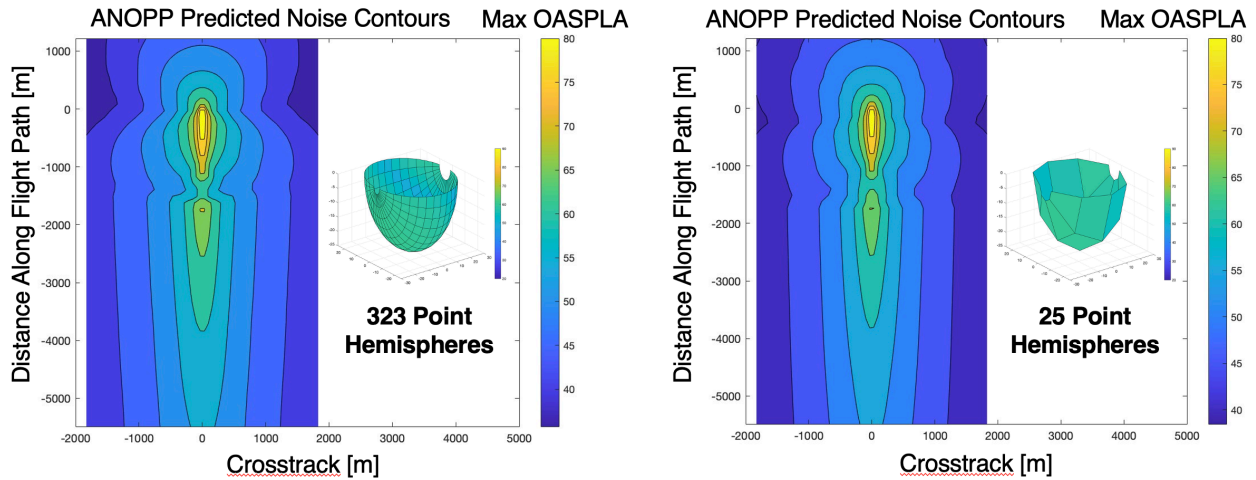
### Milestones

- Gained significant refinements to AAM flight condition modeling enable investigation of wider range of trajectories.
- Evaluated sensitivity to the source noise hemisphere, allowing for significant speedup and creation of a hemisphere database.
- Performed investigation of tilt-VTOL condition range to show that noise is highly sensitive to flight condition during configuration transition.

### Major Accomplishments

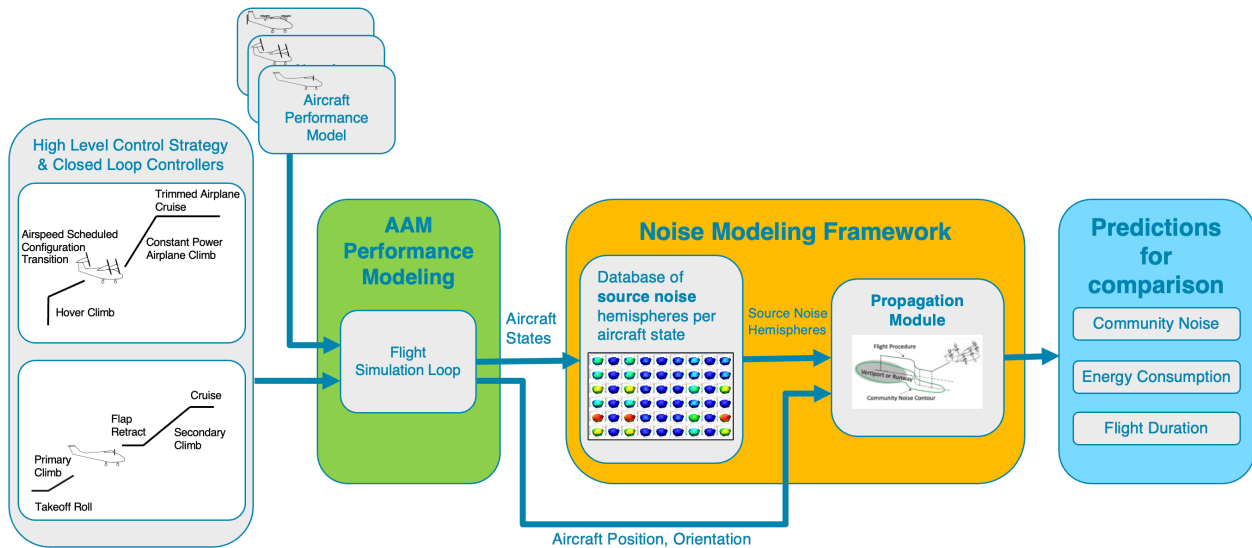
Significant refinement to the method for flight condition generation was made in the past year for all of the AAM vehicles identified in Task 1. The refined method was implemented first on the tilt-VTOL vehicle, which enabled analysis of the noise effects of a wider range of the vehicle operating space. Specifically, the capability to define vehicle trajectories by desired physical parameters, such as vehicle flight path angles, airspeeds, or altitudes was built into the simulation loop for generating flight conditions. This capability was enabled by applying closed-loop control systems to determine control inputs which would result in a pilotable version of the desired flight trajectory. To ensure the forces required were physical, the blade element momentum theory propellor design tool XROTOR was used to ensure the required shaft power did not exceed the design maximum.

A significant library of source noise hemispheres at various conditions was generated in the past year using ANOPP2 allowing the noise effects of new flight conditions to be simulated efficiently. A major speedup was achieved by conducting a sensitivity study between the resolution of the source noise hemisphere and the final ground-propagated noise, which found that reducing the resolution by approximately 13 times resulted in differences on the ground of only 1 – 3 dB on average. A representation of the results of this analysis for a reference flight trajectory is visualized in Figure 5. This reduction in resolution resulted in an approximately 40-fold time savings for hemisphere generation, allowing for a larger set of conditions to be simulated.



**Figure 5.** Visualization of propagated maximum noise results for a reference trajectory with different source noise hemisphere resolution. The left contour mapping was generated using dense hemispheres, right contour mapping was generated using coarse hemispheres. Differences are generally within 1 - 3 dBA. ANOPP: Aircraft Noise Prediction Program, OASPLA: Overall Sound Pressure Level, A-weighted.

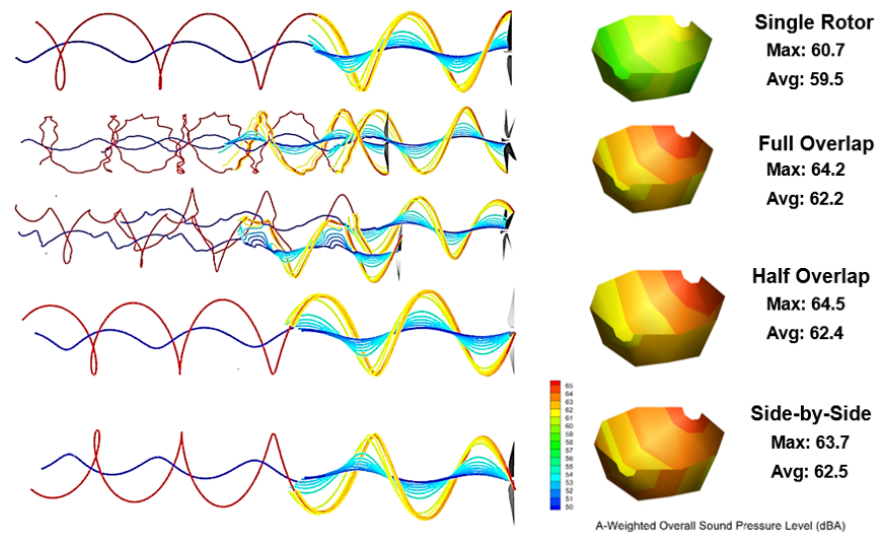
With refinements to the flight condition generation and noise hemisphere library, a wider array of operations were investigated using the updated analysis framework outlined in Figure 6. An initial finding is that the maximum noise contour from a tilt-VTOL vehicle operation is particularly sensitive to the vehicle condition during the configuration transition phase. Upon investigation this was related to increased, un-modeled crossflow when flying with rotors at nonstandard angles. This effect has motivated ongoing and future work to better capture the crossflow effects on rotor disc loading, and subsequent source noise.



**Figure 6.** Updated analysis framework for AAM noise prediction and analysis. Flight conditions are generated from simulation from a high-level control strategy, a set of closed loop controllers to maintain the strategy, and an aircraft performance model. Conditions are then matched to appropriate source noise hemispheres from database and propagated to the ground to generate resulting noise contours.

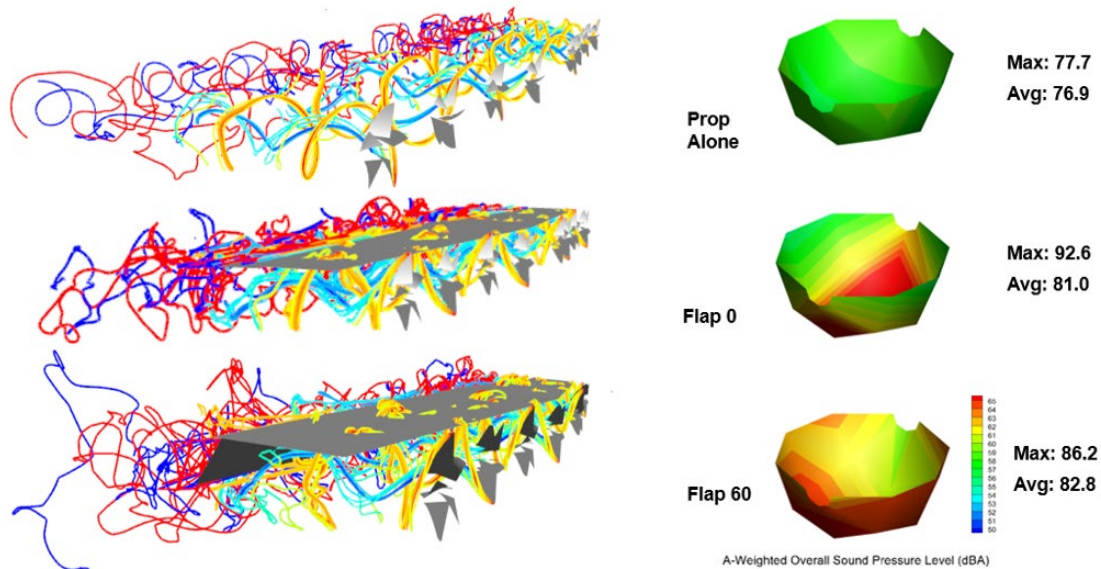


The AAM vehicles described in Task 1 were modeled while operating in regions of potential inflow complications, defined in Task 2, using CHARM. This was done to establish a range of expected noise impact while operating in these more complicated flight regimes. To study crossflow effects, the tilt-VTOL rotor was modeled in various angles nacelle tilt and was found to have an approximate 15 dB increase in noise over 45 degrees of rotor tilt. The required power also increased with increasing crossflow which was consistent with experimental results found in literature. Modeling these results in ANOPP2's ABEAT, which can also account for crossflow, revealed similar noise results. For rotor-rotor interaction, two tilt-VTOL rotors were modeled in various configurations of overlap (Figure 7) found in the Tilt-VTOL during cruise. Noise results indicate a slight increase of less than 1 dB for the full overlap case compared to a two-rotor case with no overlap in the same conditions. These results were also consistent with experimental results found in literature.



**Figure 7.** Illustrations of various conditions of rotor-rotor overlap and the resulting noise hemispheres. Results are shown in Overall Sound Pressure Level, A-weighted (OASPLA).

To study the noise effects of rotor-wing interaction, the STOL vehicle propellers were modeled with a wing in various flap conditions in CHARM to represent cruise and landing conditions (Figure 8). Experimental results in literature indicate that wing-rotor interaction noise is greatest when the vertical separation distance is less than one propeller radius apart and outside this range, the effect diminishes rapidly. The representative STOL vehicle showed noise results consistent with these findings with an average increase of 8 dB with the addition of a wing compared to results of the propellers alone.



**Figure 8.** Illustration of rotor-wing interaction modeling using the STOL vehicle and wing. The resulting noise hemispheres are shown in Overall Sound Pressure Level, A-weighted (OASPLA).

### Publications

Gonzalez, V. (2025). *A Methodology for Integrating Vehicle Performance into Traffic Flow Management Analysis for AAM Airspace Integration* [Doctoral Dissertation, University of California, Irvine]. California Digital Library. <https://escholarship.org/content/qt3sb9w403/qt3sb9w403.pdf>

Pellerito, V., Yeung, N., Huynh, j., & Hansman, R. J. (2025). Impact of flight trajectory design on performance and noise for AAM aircraft. *AIAA Journal of Aircraft*, 1-16. <https://doi.org/10.2514/1.C038248>

### Outreach Efforts

- Presented at the biannual ASCENT Advisory Board meetings.
- Collaborated with Wisk to validate assumptions regarding the expected flight profile of their new V6, tilt-VTOL vehicle.
- Participated in weekly teleconferences and meetings with FAA Technical Monitor.

### Awards

None.

### Student Involvement

Graduate students have been involved in all aspects of this research, in terms of analysis, documentation, and presentation. These students conducted the research formulating the overall framework.

### Plans for Next Period

In the upcoming period the aerodynamic effects leading to noise sensitivity during configuration transition will be modeled in more depth, both using updated versions of ANOPP2, and the more sophisticated CHARM model. The model outputs will be compared to understand what level of simplification is acceptable to retain the necessary model accuracy for tools like the AEDT. The investigation of more flight conditions will be extended to the other reference vehicle architectures. The opportunity to minimize noise exposure by changing flight procedures will also be explored. Opportunities for noise validation via industry collaborations will also be conducted on an ongoing basis.



## Task 4 – Incorporate Noise Results for Representative AAM Vehicles with the Aviation Environmental Design Tool

Massachusetts Institute of Technology  
University of California, Irvine

### Objective

The objective of this task is to incorporate noise results for representative AAM vehicles in the AEDT. Based on the results of Tasks 1, 2, and 3, an appropriate approach to model the representative vehicle in the AEDT will be determined. The existing AEDT structure will be evaluated, and operating modes necessary for the representative vehicle configuration will be identified. The noise estimates from Task 3 as a function of flight procedure characteristics will be incorporated into the AEDT. Preliminary modeling of AEDT-compatible vehicles and flight procedures will be performed as a test. In addition, the use of this technique to evaluate the noise impact of AAM of flight procedures will be examined.

### Research Approach

- Evaluate the existing AEDT structure to determine operating modes necessary for the representative AAM vehicle configurations.
- Perform initial modeling of AEDT compatible vehicles and flight procedures.

### Milestones

- Developed a process to determine the variety of operations that will be relevant to include in the AEDT for modeling AAM vehicles using a control strategy.
- Modeled a matrix of STOL operations and noise to determine how various factors impact noise.

### Major Accomplishments

The process to determine the variety of operations that will be relevant to include in the AEDT for modeling AAM vehicles involves simulating viable operations for different takeoff and landing segments. This process is based on the flight profile and noise modeling development and validation efforts from Task 3. Preliminary examples of this for different tilt rotor segments have been done.

### Publications

None.

### Outreach Efforts

- Participated in weekly teleconferences and meetings with FAA Technical Monitor.
- Presented at the biannual ASCENT Advisory Board meetings.

### Awards

None.

### Student Involvement

Graduate students have been involved in all aspects of this research, in terms of analysis, documentation, and presentation.

### Plans for Next Period

The process to determine the variety of operations that will be relevant to include in the AEDT for modeling AAM vehicles will continue to be developed to simulate different performance states for each of the vehicles that our team will be assessing, particularly for vehicles where cross flow is expected during the flight. The current AEDT structure will be examined to determine its suitability for assessing AAM noise operations in its current state and identify gaps in the modeling approaches. Our team will consult with technical experts at the Volpe National Transportation Systems Center regarding the existing AEDT structure.



## Task 5 – Expand Methods to Additional Vehicle Sets

Massachusetts Institute of Technology  
University of California Irvine

### Objective

The objective of this task will be to expand the methods developed in Tasks 3 and 4 to more complex vehicles featuring additional noise components that have not yet addressed the initial target vehicle configuration. In collaboration with FAA Technical Monitors, the noise model will be updated to incorporate these noise levels and demonstrate their utilization in the AEDT, as was done in Task 4.

### Research Approach

- Determine complex candidate vehicle sets via examination of current common vehicle configurations being proposed in industry.
- Update noise modeling methods by using advanced analysis approaches or noise data.

### Milestones

Discussed with Wisk about their V6 tilt-rotor vehicle.

### Major Accomplishments

Made a plan to incorporate Wisk's V6 vehicle into our database.

### Publications

None.

### Outreach Efforts

- Participated in weekly teleconferences and meetings with FAA Technical Monitor.
- Presented at the biannual ASCENT Advisory Board meetings.
- Collaborated with Wisk about their new V6, tilt-VTOL vehicle.

### Awards

None.

### Student Involvement

Graduate students have been involved in all aspects of this research, in terms of analysis, documentation, and presentation.

### Plans for Next Period

We will incorporate Wisk's V6 vehicle noise and operations into our database. Opportunities for gathering noise data that can be used for validation and the assessment of more complex noise sources beyond the initial modeling framework developed in Task 3 will be determined on an ongoing basis.

## Task 6 – Evaluate Implications for Noise Mitigation and Low-Noise Operations for AAM Vehicles

Massachusetts Institute of Technology  
University of California Irvine

### Objective

The objective of this task will be to determine implications for noise mitigation and low-noise operations for AAM vehicles. The development of the AEDT for the study of AAM vehicle noise is likely to yield implications for noise mitigation and low-noise operations of AAM vehicles. These implications, along with the AAM-compatible AEDT tool, will allow future research teams to continue to use the AEDT to assess AAM vehicle noise. Implications for the development of low-noise procedures



for AAM will also be evaluated. The results of the previous tasks have the potential to indicate the need for additional noise model development and validation. Validation of the noise models or flight procedures as data become available will be the goals of future research efforts.

### **Research Approach**

- Assess the noise of candidate vehicles performing several advanced flight procedures.
- Determine low-noise operations and flight procedure design for different candidate vehicles that can be assessed in the AEDT.

### **Milestones**

Process to model many flight operations using a control strategy for each vehicle is in development.

### **Major Accomplishments**

- Determined sample control strategies for the tilt-rotor vehicle based on a speed schedule during transition.
- Determined an alternative control strategy using constant power and used it to assess tilt rotor noise during transition.

### **Publications**

None.

### **Outreach Efforts**

- Participated in weekly teleconferences and meetings with FAA Technical Monitor.
- Presented at the biannual ASCENT Advisory Board meetings.

### **Awards**

None.

### **Student Involvement**

Graduate students have been involved in all aspects of this research, in terms of analysis, documentation, and presentation.

### **Plans for Next Period**

After examination of the noise of the representative vehicles operating in multiple operating conditions, the flight procedures and noise operations resulting in the lowest noise levels will be documented. This process is ongoing for the different vehicles.