

Department of the Navy SBIR/STTR Transition Program

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Topic # N102-128

Predictions of the Acoustic Nearfield on a Carrier Deck

OptiNav, Inc.

WHO

SYSCOM: NAVAIR

Sponsoring Program: NAWC-AD Propulsion and Power Engineering

Transition Target: Two planned ground tests

TPOC:
(301)757-4180

Other transition opportunities: Future tactical aircraft ground tests. Provide key acoustic flight noise data for commercial Urban Air Mobility vehicles and drones.



<https://www.defense.gov/observe/photo-gallery/igphoto/2002758818/>

Photo by: Seaman Gray Gibson

WHAT

Operational Need and Improvement: Flight measurement aircraft noise "sound spheres" using classical measurement approaches are too difficult and expensive to perform as often as needed. The Navy desires to develop a practical approach to defining the noise radiating properties of a supersonic jet so that it may be used as an equivalent source in commercial Boundary Element Analysis (BEA); Finite Element Analysis (FEA); or Statistical Energy Analysis (SEA) noise prediction models. Modern supersonic jets produce a high amplitude noise field with complicated characteristics that is not easily modeled using classical analytical approaches. Aircraft static ground noise tests to characterize jet exhaust noise need to be more robust in terms of limited number of microphones and handling test site obstructions.

Specifications Required: Demonstrate the ability to account for superposition of the jet noise field from multiple jets during simulated high activity carrier launch and retrieval operations as well as the noise reflecting characteristics of the aircraft, jet blast deflectors and other carrier deck features. Capable of predicting the frequency and angle dependent noise fields out to all practical distances.

Technology Developed: 1. Algorithms and software to improve jet ground test obstacle reflections and fill in missing microphones by mathematical/physical analysis. 2. Revolutionary technique for noise flight tests leading to much lower cost of facilities, personnel, and equipment and better accuracy. Effects of unknown wind and interfering noise are removed from the data.

Warfighter Value: Understanding aircraft noise supports engineering efforts to reduce noise. Both the understanding and possible reduction help to manage relations with communities around air bases and reduce pressure to curtail operations. Noise exposure can cause hearing loss among aircraft carrier flight deck crew members, so understanding and possible mitigation needs apply here as well. OptiNav's method for predicting community aircraft noise based on sophisticated analysis of microphone array data simplifies testing, lowers cost and improves results compared with traditional approaches.

WHEN

Contract Number: N68335-19-C-0528 **Ending on:** December 31, 1969

Milestone	Risk Level	Measure of Success	Ending TRL	Date
Algorithms for ground test	N/A	Demonstrate the ability to reproduce existing (2014) test data	6	July 2021
Sound sphere software	Low	Demonstrate the ability to construct the sound spheres	5	August 2021
Transition ground tests	Low	Success: Data consistency	7	December 2021
Sound sphere target of opportunity tests	Med	Obtain Consistent results per aircraft model	7	September 2022

HOW

Projected Business Model: Contract/License processing static aircraft noise test data. Contract/License measurement and processing flight noise test to produce aircraft, configuration, and operation-specific "sound spheres". Production of sound spheres of uncooperating aircraft for competitive advantage and noise regulation.

Company Objectives: Meet the needs of the NAVAIR Propulsion and Power to support ground testing. Become the go-to source for sound spheres.

Potential Commercial Applications: Meet the important need for noise characterization of Urban Air Mobility vehicles and package delivery drones.

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