

AFRL FY16 Research Topic Template – DAGSI – AFIT - USAFA

1. Research Title: Sources of Hydrodynamic Noise in Human Listening Environment

2. Individual Sponsor:

Sponsor's Name: Dr. Frank Mobley

Office Symbol: 711 HPW/RHCB

Bldg #: 441

Complete Mailing Address: 2610 Seventh Street, WPAFB, OH 45433

Email: Frank.mobley.1@us.af.mil

3. Academic Area/Field and Education Level: Engineering Physics, Physics, Mechanical Engineering, Aerospace Engineering (MS and/or Ph.D. level)

4. Objectives: The objective of this effort is to develop and demonstrate procedures to evaluate, quantify, and describe the phenomenological causes of hydrodynamic noise around the human head. It also seeks to describe the changing noise field when the head is at different polar angles with respect to the bulk fluid flow.

5. Description: Field testing of acoustic models frequently requires that a human be placed in an outdoor listening environment for validation of physical predictions. A more controlled method to validate these predictions is to run subjects in a laboratory environment. During outdoor field tests it was observed that wind-noise caused a significant change to the listening environment. Attempts to characterize these effects have been accomplished at a low speed wind tunnel at Wright-Patterson Air Force Base (WPAFB), Ohio. These measurements have been compared with laboratory and field physical acoustic measurements, but the phenomenological source of the hydrodynamic noise has not been determined. Students will be asked to employ numerical methods (Computational Fluid Dynamics) to analyze the structure and cause of the observed hydrodynamic noise with the wind in various polar directions. Additional measurements at the WPAFB Low-speed Wind Tunnel may be used as validation of the numerical results.

6. Research Classification/Restrictions: This research will involve basic and applied research in the area of human hearing and is within the 6.1/6.2 research classification.

7. Eligible Research Institutions: Indicate to what organizations this topic should be provided. Check all that apply.

DAGSI

AFIT (only)

USAFA (only)

If you are submitting a topic for the USAFA, please indicate if you are also interested in sponsoring a USAF Cadet in summer of 2014 (Avg Cost for USAF Cadet for 33 days was \$5000)

Yes No