Abstract Submitted
for the DFD17 Meeting of
The American Physical Society

Acoustic Characterization of a Multi-Rotor Unmanned Aircraft

JORDAN FEIGHT, RICHARD GAETA, JAMEY JACOB, Oklahoma State University — In this study, the noise produced by a small multi-rotor rotary wing aircraft, or drone, is measured and characterized. The aircraft is tested in different configurations and environments to investigate specific parameters and how they affect the acoustic signature of the system. The parameters include rotor RPM, the number of rotors, distance and angle of microphone array from the noise source, and the ambient environment. The testing environments include an anechoic chamber for an idealized setting and both indoor and outdoor settings to represent real world conditions. PIV measurements are conducted to link the downwash and vortical flow structures from the rotors with the noise generation. The significant factors that arise from this study are the operational state of the aircraft and the microphone location (or the directivity of the noise source). The directivity in the rotor plane was shown to be omni-directional, regardless of the varying parameters. The tonal noise dominates the low to mid frequencies while the broadband noise dominates the higher frequencies. The fundamental characteristics of the acoustic signature appear to be invariant to the number of rotors. Flight maneuvers of the aircraft also significantly impact the tonal content in the acoustic signature.

Jamey Jacob
Oklahoma State University

Date submitted: 01 Aug 2017 Electronic form version 1.4