Abstract Submitted
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Ducted Rotor Acoustics DAVID STEPHENS, SCOTT MORRIS, University of Notre Dame — The effect of blade loading on the far field acoustics of a subsonic ducted rotor was studied using an experimental model. Ducted rotors create dipole sound through many mechanisms that lead to a complex acoustic signature with broadband and tonal features. These sound producing mechanisms include unsteady blade loading due to ingested turbulence, tip flows, and rotor blade boundary layer effects. Modeling these sources requires an understanding of the interaction between turbulent flows and the rotating blades. The scale and structure of the rotor blade boundary layers are dependent on the blade loading, and turbulence in the boundary layer scatters off the trailing edge to produce noise. In the present work hot wire anemometry was used to document relevant length scales and turbulence levels in the rotor wake in order to better understand these sources of sound. Far field microphone measurements were acquired in an anechoic chamber to correlate blade loading effects with acoustic signatures. Measured acoustic spectra are compared with dipole source models from the literature to resolve variations in sources due to the effects of blade loading.

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