Abstract Submitted
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Large eddy simulation of trailing edge noise[1] JACOB KELLER, ZANE NITZKORSKI, KRISHNAN MAHESH, University of Minnesota — Noise generation is an important engineering constraint to many marine vehicles. A significant portion of the noise comes from propellers and rotors, specifically due to flow interactions at the trailing edge. Large eddy simulation is used to investigate the noise produced by a turbulent 45 degree beveled trailing edge and a NACA 0012 airfoil. A porous surface Ffowcs-Williams and Hawkings acoustic analogy is combined with a dynamic endcapping method to compute the sound. This methodology allows for the impact of incident flow noise versus the total noise to be assessed. LES results for the 45 degree beveled trailing edge are compared to experiment at $M = 0.1$ and $Re_c = 1.9e6$. The effect of boundary layer thickness on sound production is investigated by computing using both the experimental boundary layer thickness and a thinner boundary layer. Direct numerical simulation results of the NACA 0012 are compared to available data at $M = 0.4$ and $Re_c = 5.0e4$ for both the hydrodynamic field and the acoustic field. Sound intensities and directivities are investigated and compared. Finally, some of the physical mechanisms of far-field noise generation, common to the two configurations, are discussed.

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