

Abstract Submitted  
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**An Experimental Study on the aerodynamic and aeroacoustic performances of Maple-Seed-Inspired UAV Propellers<sup>1</sup>** HUI HU, ZHE NING, Iowa State University — Due to the auto-rotating trait of maple seeds during falling down process, flow characteristics of rotating maple seeds have been studied by many researchers in recent years. In the present study, an experimental investigation was performed to explore maple-seed-inspired UAV propellers for improved aerodynamic and aeroacoustic performances. Inspired by the auto-rotating trait of maple seeds, the shape of a maple seed is leveraged for the planform design of UAV propellers. The aerodynamic and aeroacoustic performances of the maple-seed-inspired propellers are examined in great details, in comparison with a commercially available UAV propeller purchased on the market (i.e., a baseline propeller). During the experiments, in addition to measuring the aerodynamic forces generated by the maple-seed-inspired propellers and the baseline propeller, a high-resolution Particle Image Velocimetry (PIV) system was used to quantify the unsteady flow structures in the wakes of the propellers. The aeroacoustic characteristics of the propellers are also evaluated by leveraging an anechoic chamber available at the Aerospace Engineering Department of Iowa State University.

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