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Effect of Propeller Angle Relative to Flow on Aerodynamic Characteristics.[1] JOSEPH SCHUELLER, Morningside College, PAUL HUBNER, University of Alabama — As the interest in small unmanned air systems (UASs) for delivery and surveillance grows, new hybrid designs are being studied to take advantage of both quadcopters and fixed-wing aircraft. The tiltrotor design is able to combine the vertical take-off, hover, and landing of a multi-rotor copter with the efficiency of forward flight of a conventional airplane. However, literature documenting aerodynamic performance of the rotor as it rotates between the forward-flight and hover positions, especially in this low Reynolds number range, is limited. This data is critical for validating computational models and developing safe transition corridors. The objective of this research was to design, build and test a rotor thrust stand capable of rotating between the forward-flight and hover configurations suitable for senior design studies at low Reynolds number research. The poster covers the design of the rotating mechanism, the range and resolution of the load cell, and the thrust, torque and efficiency results for a conventional UAS motor and propeller for various advance ratios and thrust-line orientations.

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