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Aerodynamic Analysis of Morphing Blades[1] CALEB HARRIS, The University of Memphis, DAVID MACPHEE, The University of Alabama, MADELINE CARLISLE, Louisiana Tech University — Interest in morphing blades has grown with applications for wind turbines and other aerodynamic blades. This passive control method has advantages over active control methods such as lower manufacturing and upkeep costs. This study has investigated the lift and drag forces on individual blades with experimental and computational analysis. The goal has been to show that these blades delay stall and provide larger lift-to-drag ratios at various angles of attack. Rigid and flexible airfoils were cast from polyurethane and silicone respectively, then lift and drag forces were collected from a load cell during 2-D testing in a wind tunnel. Experimental data was used to validate computational models in OpenFOAM. A finite volume fluid-structure-interaction solver was used to model the flexible blade in fluid flow. Preliminary results indicate delay in stall and larger lift-to-drag ratios by maintaining more optimal angles of attack when flexing.

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