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Experimental Study of the Power Profile Airfoil Equipped with Plasma Flow Control LIBIN DANIEL, JAMEY JACOB, Oklahoma State University — This presentation discusses results from an experimental study of the power profile airfoil at low Reynolds number. The power profile airfoil was developed by AMO Smith and consists of a blunt trailing edge shape with two wall jets near the trailing edge. The replacement of streamlining with properly designed blowing is used to prevent flow separation and additionally offers potential applications as a powered high-lift system, propulsive system, or low inertia control device. The 2D wind-tunnel model consists of the 22.5% thick power profile airfoil equipped with a movable trailing edge plug to direct flow along the trailing edge streamline. Compressed air was passed into the model via a plenum with flow conditioning devices to create pressure backdrop to allow uniform blowing at the trailing edge. The effects of varying jet momentum coefficient and trailing edge positioning on the aerodynamic characteristics are observed with both wake surveys and PIV. The impact of plasma synthetic jet actuators (PSJA) placed along the trailing edge of the power profile airfoil is also discussed. PSJA operation is compared to the baseline power profile airfoil both alone and working with the blowing to provide additional control authority.

Jamey Jacob
Oklahoma State University

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