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Active flow control for a NACA-0012 Profile: Part II H. OUALLI, M. MAKADEM, H. OUCHENE, A. FERFOURI, École Militaire Polytechnique, Algiers, Algeria, A. BOUABDALLAH, Université des Sciences et de la Technologie Houari Boumediene, Algiers, Algeria, M. GAD-EL-HAK, Virginia Commonwealth University, Richmond, Virginia, USA — Active flow control is applied to a NACA-0012 profile. The experiments are conducted in a wind tunnel. Using a high-resolution visible-light camera and tomography, flow visualizations are carried out. LES finite-volume 3D code is used to complement the physical experiments. The symmetric wing is clipped into two parts, and those parts extend and retract along the chord according to the same sinusoidal law we optimized last year (B. Am. Phys. Soc., vol. 60, no. 27, p. 247, 2015) for the same profile but clipped at an angle of 60 deg, instead of the original 90 deg. The Reynolds number range is extended to 500,000, thus covering the flying regimes of micro-UAVs, UAVs, as well as small aircraft. When the nascent cavity is open and the attack angle is 30 deg, the drag coefficient is increased by 1,300%, as compared to the uncontrolled case. However, when the cavity is covered and Re $\leq 10^5$, a relatively small frequency, $f \leq 30$ Hz, is required for the drag coefficient to drop to negative values. At the maximum Reynolds number, thrust is generated but only at much higher frequencies, $12 \leq f \leq 16$ kHz.

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