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Internal flow properties of a Sweeping Jet actuator for different Coanda surface geometries[1] VLADIMIR PAREZANOVIĆ, MARIAM AMER, ABDUL RAOUF TAJIK, Khalifa University of Science and Technology — We investigate the internal flow dynamics of a Sweeping Jet (SWJ) actuator with different Coanda surface shapes, using time-resolved pressure and PIV measurements. The performance of each design is assessed in terms of the jet oscillation frequency, the static pressure drop, and the spectral distribution quality. Three different Coanda surface profiles are tested: (i) a diverging straight line, (ii) a curved elliptical profile, and (iii) a backward-facing step profile. High-frequency Kulite pressure sensors are used to record the temporal flow dynamics at key points inside the actuator. It is observed that a straight-line surface yields the best oscillation frequency peak definition. An elliptical profile is causing a lower pressure drop by around 10%, which makes it the most energy-efficient design. The Coanda surface with a backward-facing step profile increases the jet oscillation frequency by up to 30% for the higher actuator mass flow rates. However, this increase in maximum frequency is accompanied by an inferior oscillation frequency peak definition. Time-resolved PIV measurements of the internal flow will be presented to discuss the physical mechanisms specific to each of the different Coanda surface geometries, which are responsible for these performance improvement.

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