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The effects of geometrical modifications on flow characteristics of a sweeping jet actuator.[1] ABDUL RAOUF TAJIK, BARTOSZ SLUPSKI, VLADIMIR PAREZANOVIC, Khalifa University, UAE — This work studies the effects of modifications of the internal geometry of a sweeping jet (SWJ) actuator, such as the feedback channel diameter (D_1) and the size of its exit nozzle (D_2). The effects on the jet frequency and the overall pressure drop in the actuator are investigated using time-resolved flow fields from 2D-URANS simulations and local pressure data from experimental measurements. Similarly to [1], it is observed that the variation of the feedback channel diameter D_1 has little impact on the sweeping jet frequency magnitude. However, the spectrum of the sweeping jet yields a much better definition of the frequency peaks for larger D_1 diameters of the feedback channel. This is a surprising result, considering that the enlarged diameter could be expected to diffuse the feedback flow momentum and thus reduce the quality of the peak definition. On the other hand, the reduction of diameter D_2 of the feedback channel exit yields up to 50% increase in the SWJ oscillation frequency for the same pressure drop along the actuator axis. This could be a significant optimization of the SWJ geometry, given that reduced energy investment is required to produce the same oscillation frequency.

[1][1]. J.H. Seo, et al, AIAA Journal 56(6) 2208-2219 (2018). This work has been supported by the Khalifa University of Science and Technology under Award No(s). FSU-2018-21 and CIRA-2019-025.

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