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Experimental Investigation of a Fluidic Oscillator for Application to Pulsed-Jet Propulsion ANNIE VAHEDIPOUR, PAUL KRUEGER, Southern Methodist University — A fluidic oscillator with no moving parts is configured with nozzles at the exit ports and is investigated experimentally to assess its performance in a configuration appropriate for continuous pulsed-jet propulsion. Oscillation frequency was controlled via the length of an external feedback tube. Performance of the oscillator was quantified by pressure measurements throughout the device, time-averaged thrust measurements, and digital particle image velocimetry (DPIV) measurements of the jet flow. Feedback tube lengths in the range 0.4 – 2 m and two flow rates (corresponding to mean jet Reynolds numbers of 9150 and 13500) were tested. Similar to prior studies, decreasing the feedback tube length and increasing the flow rate increased the oscillation frequency. However, no backflow was observed in the non-active outlet. Irregular oscillations were observed at higher frequency, but active occlusion of the feedback tube provided on/off switching of the oscillations. DPIV measurements showed formation of vortex rings at the initiation of a jet pulse, but these did not dominate the flow as the pulse durations were long for the frequency range studied.

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