SMU Department of Mechanical Engineering

M.S.THESIS DEFENSE

"Experimental Investigation of a Fluidic Oscillator for Application to Pulsed-Jet Propulsion"

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Abstract: A fluidic oscillator with no moving parts was configured with nozzles at outlets and was investigated experimentally to assess its performance in a configuration appropriate for continuous pulsed-jet propulsion. The operating frequency of the fluid oscillator constructed for this study was adjusted by both the flow rate and the feedback loop length and was varied through all the different experiments. 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. As expected from prior studies, an increase in the feedback tube length resulted in a decrease of the oscillation frequency and an increase of the flow rate resulted in an increase of the oscillation frequency. Shorter feedback tubes resulted in more irregular oscillation and blocking the feedback tube was directly effective to switching (on/off) the oscillation. 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.