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**Characterization of Combustion Powered Actuators for Flow Control**[1] BRETT WARTA, ARI GLEZER, Georgia Institute of Technology, THOMAS CRITTENDEN, Virtual AeroSurface Technologies, Inc. — The performance of a high-power small-scale combustion-based fluidic actuator for flow control applications is characterized with specific focus on comparisons between premixed and nonpremixed operating modes for the device. Momentary (pulsed) actuation jets are produced by the ignition of a mixture of gaseous fuel and oxidizer within a small (cubic centimeter scale) combustion chamber. The combustion process yields a high pressure burst (1 to 3 ms in duration in the typical configurations) and the ejection of a high-speed exhaust jet. The actuation frequency can be continuously varied by independently controlling the flow rate of the fuel/oxidizer and the spark ignition frequency up to a maximum determined by the operating characteristics of the actuator. The actuator performance is characterized by both its peak thrust and net total impulse, with increases in peak jet momentum often two to three orders of magnitude above the baseline steady jet. Results for operation of the device in both premixed and nonpremixed modes are presented and analyzed, with nonpremixed operation typically yielding higher pressures and greater frequency ranges in the present configurations. Operating frequencies up to 500 Hz are demonstrated for nonpremixed operation.

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