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Synthetic Jet Actuator Performance Enhancement LUCIA PIKCILINGIS, KEVIN HOUSLEY, Rensselaer Polytechnic Institute, ED WHALEN, The Boeing Company, MICHAEL AMITAY, Rensselaer Polytechnic Institute, RENSSELAER POLYTECHNIC INSTITUTE COLLABORATION, THE BOEING COMPANY COLLABORATION — Over the last 20 years synthetic jets have been studied as a means for aerodynamic flow control. Specifically, synthetic jets provide momentum transfer with zero-net mass flux, which has been proven to be effective for controlling flow fields. A synthetic jet is created by the periodic formation of vortex rings at its orifice due to the periodic motion of a piezoelectric disk(s). The present study seeks to optimize the performance of a synthetic jet actuator by utilizing different geometrical parameters such as disk thickness, orifice width and length, cavity height and cavity diameter, and different input parameters such as voltage and frequency. Experiments were conducted using a synthetic jet apparatus designed for various geometrical parameters utilizing a dual disk configuration. Velocity and temperature measurements were acquired at the center of the synthetic jet orifice using a temperature compensated hotwire and thermocouple probe. The disk displacement was measured at the center of the disk with a laser displacement sensor. It was shown that the synthetic jet actuators are capable of exceeding peak velocities of 200 m/s with a relatively large orifice. Data suggests that jet velocities greater than 200 m/s are attainable.

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