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Evolution of Synthetic Jets of Different Orifice Geometries in a Laminar Boundary Layer TUFAN GUHA, MICHAEL AMITAY, Rensselaer Polytechnic Institute — The use of synthetic jets for active flow control has been in focus for several decades. The aim of the present experimental study is to investigate the interaction of a finite aspect ratio jet having different orifice geometries with a 2-D laminar boundary layer over a flat plate. Three actuators having the same exit area and the same aspect ratio of 18, but different orifice geometries (rectangular, trapezoidal, and triangular), were studied using Stereoscopic Particle Image Velocimetry. Results show that for all three orifice geometries the near-field is unsteady. The far-field of the rectangular orifice consists of a pair of equal strength counter-rotating vortex pair, travelling parallel to the orifice centerline. The far-fields of the triangular and the trapezoidal orifices consist of a single vortex vectoring away from the centerline, towards the tapered side. The vectoring angle is larger for the triangular orifice at approximately 5.8 deg. The study shows that a trapezoidal or a triangular orifice can be used for vectoring a synthetic jet in a uniform crossflow and might be useful for improving its performance in the presence of spanwise flow.

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