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Effect of Orifice Angle on Synthetic Jet Actuators POOYA KABIRI, KEVTA Fire Systems, DOUG BOHL, Clarkson University — Synthetic Jet Actuators (SJA's) are commonly used in flow control experiments. It has been shown that in many applications the direction of the jet with respect to the flow direction and surface geometry is important. For example, when controlling separation on an airfoil, the maximum control is obtained when the exit jet is directed parallel, rather than perpendicular to the surface. Typically, the SJA itself must be rotated to direct the flow. In some cases this may not be possible and the orifice must be oriented to direct the flow. This work investigates the flow field induced by a SJA's with the exit orifice located on the surface opposite of the membrane and differing exit angles. The orifices investigated are oriented straight (i.e. 90°) or angled (60°, 30°) with respect to the membrane surface. The entrances to the orifices are contoured to inhibit flow separation within the orifice. The results show that the peak exit velocity is found when the orifice is straight and systematically reduces as the angle becomes smaller. The results also show that the external flow field is greatly affected by the orifice angle. When the orifice is straight a pair of vortices are formed that convect away from the slot. As the angle is reduced a boundary layer is formed on the external surface of the SJA. This boundary layer changes the formation of the vortex pair and inhibits convection of the vortices away from the slot.

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