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**Synthetic Jet Interactions with Flows of Varying Separation Severity and Spanwise Flow Magnitude**[1] ANNIKA LINDSTROM, MARIANNE MONASTERO, MICHAEL AMITAY, Rensselaer Polytech Inst — Flow physics associated with the interactions of synthetic jet actuators with a highly three-dimensional separated flow over a flapped airfoil were investigated experimentally and analyzed using stereo particle image velocimetry (SPIV) and surface pressure data. Increased understanding of active flow control devices in flows which are representative of airplane wings or tails can lead to actuator placement (i.e., chordwise location, spanwise spacing) with the greatest beneficial effect on performance. An array of discrete synthetic jets was located just upstream of the control surface hingeline and operated at a blowing ratio of 1 and non-dimensional frequency of 48. Detailed flowfield measurements over the control surface were conducted, where the airfoil's sweep angle and the control surface deflection angle were fixed at 20. Focus was placed on the local and global flowfields as spanwise actuator spacing was varied. Moreover, surface pressure measurement for several sweep angles, control surface deflection angles, and angles of attack were also performed. Actuation resulted in an overall separation reduction and a dependence of local flowfield details (i.e. separation severity, spanwise flow magnitude, flow structures, and jet trajectory) on spanwise jet spacing.

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