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The control effect in a detached laminar boundary layer of an array of normal synthetic jets.[1] FERNANDO VALENZUELA CALVA, RUBEN AVILA RODRIGUEZ, Universidad Nacional Autonoma de Mexico — In this work, 3D numerical simulations of an array of three normal circular synthetic jets embedded in an attached laminar boundary layer that separates under the influence of an inclined flap are performed for flow separation control. At the beginning of the present study, three cases are used to validate the numerical simulation with data obtained from experiments. The experimental data is chosen based on the cases which presented higher repeatability and reliability. Simulations showed reasonable agreement when compared with experiments. The simulations are undertaken at three synthetic jet operating conditions, i.e. Case A: $L = 2$, $VR = 0.32$; Case B: $L = 4$, $VR = 0.64$ and Case C: $L = 6$, $VR = 0.96$. The vortical structures produced for each synthetic jet operating condition are hairpin vortices for Case A and tilted vortices for Case B and C, respectively. By examining the spatial wall shear stress variations, the effect on the boundary layer prior to separation of the middle synthetic jet is evaluated. For effective flow control, produced at a relatively low the finding from this study suggests that hairpin vortical structures are more desirable structures.

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