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Roughness effects on the control of laminar separated boundary layers[1] AYSE GUL GUNGOR, Istanbul Technical University Faculty of Aeronautics and Astronautics, MARK PHIL SIMENS, School of Aeronautics, Universidad Politécnica de Madrid — The effect of roughness positioned upstream of a separation bubble is studied by direct numerical simulation using a high resolution numerical scheme, and the immersed boundary method. The two-dimensional roughness elements have rectangular shapes, and a height h between 0.9 and $1.8\theta_0$, θ_0 being the inflow momentum thickness. The preliminary 2D studies show a decrease in the extent of the separation bubble as well as the separation position compared with the baseline case without surface roughness. The 3D studies show an earlier transition which eliminates the laminar separation bubble completely. Furthermore, it shows that downstream of the position where the original separation bubble reattaches, the skin friction, C_f follows the same functional behavior as the C_f in the uncontrolled flow, although having a higher value. Further work will be done in trying to optimize the roughness based control, which consists in minimizing the profile losses by finding a balance between the reduction of the extent of the separation bubble and the transition to turbulence.

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