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Transient growth in the asymptotic suction boundary layer
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— Recent experimental studies on roughness induced transient growth have shown that suboptimal perturbation theory may predict the evolution of energy in the streamwise direction. However there is a fundamental difference between the experimentally generated streaks using roughness elements and the ones arising from the theory. Knowledge in this area is sought after so that transition originating from transient growth may be predicted accurately. In the current experimental investigation we have performed a geometrical parameter analysis in order to study the transient energy growth behind a spanwise array of cylindrical roughness elements. We have chosen to work with the asymptotic suction boundary layer (ASBL), which has the advantage that we may change the boundary layer thickness and the Reynolds number independently. Five different heights of roughness elements were used along with three different free stream velocities. The applied pressure drop across the porous material gave a constant displacement thickness $d = 1.45$ mm. We will present the energy evolution of the individual modes triggered by the roughness array using spatial mode decomposition. Furthermore, the experimental results will be compared with suboptimal perturbation theory on the ASBL.

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