

Abstract Submitted
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Receptivity, Growth and Breakdown of Görtler Vortices TAMER ZAKI, Imperial College London, UK, LARS-UVE SCHRADER, LUCA BRANDT, KTH Mechanics, Stockholm, Sweden — The flow over a concave plate with constant radius of curvature is considered using direct numerical simulations. The boundary layer forming on the plate is exposed to wall roughness and to free-stream vortical disturbances. These sources trigger steady or traveling Görtler modes composed of counter-rotating streamwise rolls and streamwise streaks. We present a parametric study of receptivity to localized roughness elements with various length scales, shapes and downstream positions and to vortical modes with different wavenumbers and frequencies. The associated receptivity mechanisms are characterized in terms of receptivity coefficients. We discuss linear and nonlinear receptivity to free-stream vorticity and determine the relevance of these mechanisms in boundary layers exposed to turbulent free streams with different frequency spectra.

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