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**Receptivity of Three-Dimensional Boundary Layers** LARS-UE  
SCHRADER, LUCA BRANDT, DAN HENNINGSON, KTH Mechanics, Stockholm, Sweden — Transition to turbulence of a boundary layer on swept aircraft wings, for instance, originates in external disturbances acting on the boundary layer and entering into it. These outer disturbances may arise from e.g. surface roughness or from the turbulent motion of the incoming flow upstream of the wing. This DNS study deals with the linear receptivity mechanisms associated with a spanwise periodic, chordwise localized roughness element on the one hand and a single vortical Orr-Sommerfeld free-stream mode on the other hand. Both types of external disturbances have been employed slightly downstream of the leading edge, exciting a steady or a travelling crossflow-instability wave, respectively. The efficiency of the crossflow eigenmode excitation has been measured in terms of a receptivity coefficient. Further, the nonlinear interaction between the roughness-induced disturbance and the disturbance due to the vortical free-stream mode has been investigated.

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