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**Global stability and frequency response of boundary layers developing over shallow cavities** UBAID QADRI, PETER SCHMID, Imperial College, London — In the presence of surface imperfections, the boundary layer developing over an aircraft wing can separate and reattach, leading to a small separation bubble. We study the flow over a shallow rectangular cavity at Reynolds numbers at which the boundary layer is unstable to Tollmien-Schlichting waves. We obtain steady two-dimensional solutions to the incompressible Navier-Stokes equations and study the growth of three-dimensional perturbations on top of these steady base flows. We use the linearized Navier-Stokes operator to identify how the dominant modes of instability vary with the thickness of the upstream boundary layer and with the cavity aspect ratio. We calculate the global frequency response and optimal forcing to map out the influence of the cavity on the growth of TS-waves. Finally, we compare the results with those for boundary layers developing over backward-facing and forward-facing steps.

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