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Effect of a 3D surface depression on boundary layer transition
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— The influence of a three-dimensional surface depression on the transitional boundary layer is investigated numerically. In the boundary layer transition, the primary mode is a Tollmien-Schlichting (TS) wave which is a viscous instability. These modes are receptive to surface roughness interacting with free stream disturbances and/or surface vibrations. In this paper, numerical calculations are carried out to investigate the effect of the depression on instability of the boundary layer. In order to implement linear analysis, two/three (2D/3D)-dimensional nonlinear Navier-Stokes equations are solved by spectral element method to generate base flows in a sufficient large domain. The linear analyses are done by the parabolic stability equations (PSE). Finally, a DNS calculation is done to simulate the boundary layer transition.

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