

Abstract Submitted
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RNS computations of the boundary layer flow over grooved plate

JUAN MARTIN, CARLOS MARTEL, ETSI Aeronauticos, Universidad Politecnica de Madrid — We use the Reduced Navier-Stokes equations (RNS) to compute the evolution of the 3d boundary layer flow over a plate with small depth streamwise grooves carved in it. The RNS are derived from the Navier-Stokes equations for flows with large Re number with one slow scale and two short scales. The resulting RNS are nonlinear and fully parabolic equations. In this work we comment the details of the numerical integration of the RNS, where we use a conformal mapping to include the effect of the grooved bottom. We present the resulting flow structures due to the geometry of the problem, also a parametric study to evaluate the effect of the spanwise wave number over the flow configuration. The RNS computations are much more less CPU costly than full 3D DNS, and does not exhibit the numerical instabilities present in previous PSE calculations.

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