Abstract Submitted
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Effects of non-adiabatic walls on shock/boundary-layer interaction using direct numerical simulations[1] PEDRO S. VOLPIANI, University of Maryland, College Park, MATTEO BERNARDINI, University of Rome, La Sapienza, JOHAN LARSSON, University of Maryland, College Park — The influence of wall thermal conditions on the properties of an impinging shock wave interacting with a turbulent supersonic boundary layer is a research topic that still remains underexplored. In the present study, direct numerical simulations (DNS) are employed to investigate the flow properties of a shock wave interacting with a turbulent boundary layer at free-stream Mach number $M_\infty = 2.28$ with distinct wall thermal conditions and shock strengths. Instantaneous and mean flow fields, wall quantities and the low-frequency unsteadiness are analyzed. While heating contributes to increase the extent of the interaction zone, wall cooling turns out to be a good candidate for flow control. The distribution of the Stanton number shows a good agreement with prior experimental studies and confirms the strong heat transfer and complex pattern within the interaction region. Numerical results indicate that the changes in the interaction length are mainly linked to the incoming boundary layer as suggested in previous studies (Souverein et al., 2013 and Jaunet et al., 2014).

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