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Investigation of Shock-Induced Laminar Separation Bubble in a Supersonic Boundary Layer[1] JAYAHAR SIVASUBRAMANIAN, HERMANN FASEL, University of Arizona — The interaction between an impinging oblique shock and a laminar boundary-layer on a flat plate is investigated using DNS. In particular, the two-dimensional separation bubble resulting from the shock/boundary-layer interaction (SBLI) at freestream Mach number of 2.0 is investigated in detail. The flow parameters used for the present investigation match the laboratory conditions in the experiments by Hakkinen *et al.* The skin friction and pressure distribution from the simulations are compared to the experimental measurements and numerical results available in the literature. Our results confirm the asymmetric nature of the separation bubble as reported in the literature. In addition to the steady flow field calculations, the response to low-amplitude disturbances is investigated in order to study the linear stability behavior of the separation bubble. For comparison, both the development of two-dimensional and three-dimensional (oblique) disturbances are studied with and without the impinging oblique shock. Furthermore, the effects of the shock incidence angle and Reynolds number are also investigated. Finally, three-dimensional simulations were performed in order to explore the laminar-turbulent transition process in the presence of a laminar separation bubble.

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