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The re-laminarization of a supersonic boundary layer subject to a strong convex curvature[1] CHRISTIAN LAGARES, University of Puerto Rico at Mayaguez, KENNETH JANSEN, University of Colorado - Boulder, GUILLERMO ARAYA, University of Puerto Rico at Mayaguez — The relaminarization of supersonic, spatially developing, turbulent boundary layers (SSDTBL) subject to strong convex curvatures has many applications, but published studies on the subject are scarce. Early work by Luker, Bowersox and Buter (2000) explored the influence of such geometries experimentally at Mach 2.9. They found a sharp decrease of the turbulence intensity and Reynolds shear stress with respect to a reference zero-pressure gradient (ZPG) region in the near-wall region. Furthermore, large eddies where being annihilated by the FPG into small eddies. In the present work, we explore the effect of a very strong convex curvature (with the ratio of curvature radius to inlet boundary layer thickness around 6) on a SSDTBL through a high-resolution Direct Numerical Simulation (DNS). Preliminary results exhibit a similar behavior to the one previously described. Our focus for the present study will be the assessment of the impact of convex streamline curvature on large coherent structures via 3D two-point correlation. Furthermore, we also assess the impact on the energy cascade through the power spectrum. Lastly, we compare and contrast the present results with available experimental and computational results.

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