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Turbulent thermal boundary layers subjected to severe acceleration GUILLERMO ARAYA, LUCIANO CASTILLO, Texas Tech University, Lubbock, TX — Favorable turbulent boundary layers are flows of great importance in industry. Particularly, understanding the mechanisms of quasi-laminarization by means of a very strong favorable streamwise pressure gradient is indeed crucial in drag reduction and energy management applications. Furthermore, due to the low Reynolds numbers involved in the quasi-laminarization process, abundant experimental investigation can be found in the literature for the past few decades. However, several grey zones still remain unsolved, principally associated with the difficulties that experiments encounter as the boundary layer becomes smaller. In addition, little attention has been paid to the heat transfer in a quasi-laminarization process. In this investigation, DNS of spatially-developing turbulent thermal boundary layers with prescribed very strong favorable pressure gradients (K=4x10-6) are performed. Realistic inflow conditions are prescribed based on the Dynamic Multiscale Approach (DMA) [Araya et al. JFM, vol. 670, pp. 581-605, 2011]. In this sense the flow carries the footprint of turbulence, particularly in the streamwise component of the Reynolds stresses.

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