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DSN at High Reynolds numbers of Thermal Turbulent Boundary Layers Subject to External Pressure Gradient[1] LUCIANO CASTILLO, GUILLERMO ARAYA, Texas Tech University — Direct Numerical Simulations (DNS) of thermal spatially evolving boundary layers at zero (ZPG), favorable (FPG) and adverse (APG) pressure gradients are performed. The range for the momentum thickness Reynolds number, Re_θ, varies from 300 up to 3000. The predicted skin friction coefficient and Stanton number show fairly good agreement with empirical correlations, experimental and numerical data from the literature. The effects of the Reynolds number and streamwise adverse pressure gradient on the flow and thermal parameters are also explored and visualized. Additionally, the location of the maximum thermal fluctuations in outer coordinates moves closer to the wall as the Reynolds number increases. It was confirmed that the principal effects of adverse pressure gradient on the flow were the appearance of peaks, particularly on the streamwise velocity fluctuations, in the outer region. Furthermore, as the Reynolds number increases, the location of the maximum thermal fluctuations moved closer to the wall when plotted in outer coordinates. Finally, the observed correlation between streamwise velocity and thermal fluctuations in ZPG flows disappears in Strong APG flows.

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