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Direct Numerical Simulation of Zero-Pressure Gradient and Sink Flow Turbulent Boundary Layers O. RAMESH, SAURABH PATWARDHAN, Indian Institute of Science — Direct Numerical Simulations have been performed for the zero pressure gradient (ZPG) ($600 < \mathrm{Re}_\theta < 900$) and for the sink flow turbulent boundary layers ($\mathrm{K} = 7.71\times10^{-7}$). A finite difference code on Cartesian grid was used to perform the simulations. Inflow generation method developed by Lund et al. was used to generate inflow boundary condition for the ZPG case. This method was slightly modified for the case of sink flow in view of self-similarity it possesses in the inner co-ordinates. Hence, there was no need to use empirical relations for the calculation of inlet θ or δ and rescaling in outer co-ordinates. The average statistics obtained from the simulations are in close agreement with the experimental as well as DNS data available in the literature. The intermittency distribution in the case of sink flow approaches zero inside the boundary layer ($\mathrm{y} = 0.8\delta$), an observation which is also confirmed by the experiments. This effect could be due to the acceleration near the boundary layer edge which suppresses the turbulent fluctuations near the boundary layer edge.

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