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Reynolds number dependence of turbulence statistics near the turbulent/non-turbulent interfacial layer in turbulent boundary layer XINXIAN ZHANG, TOMOAKI WATANABE, KOJI NAGATA, Nagoya University — Direct numerical simulations (DNS) of a temporally developing turbulent boundary layer (TBL) are performed for investigating the Reynolds dependence of the turbulent/non-turbulent interfacial layer (TNTI layer). The Reynolds number based on the momentum thickness ranges from 2000 to 13000 in the present DNS. The outer edge of the TNTI layer, called irrotational boundary, is detected as an isosurface of vorticity magnitude, and the conditional statistics are calculated conditioned on the distance from the irrotational boundary. The results show that the mean thickness of the TNTI layer divided by the Kolmogorov scale is almost constant for different Reynolds numbers when the Kolmogorov scale is taken near the TNTI layer. On the other hand, the mean thickness normalized by Taylor microscale decreases as the Reynolds number increases. Influence of the wall on the statistics near the TNTI layer are shown to be stronger for a lower Reynolds number. Geometry of the irrotational boundary is also studied for the mean curvature and surface area. It is shown that the mean curvature normalized by the Kolmogorov scale has a similar probability density function for all the Reynolds numbers while the surface area increases with the Reynolds number.

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