Conditional analysis of the statistics near the turbulent/non-turbulent interface of turbulent boundary layers HIROKI OGASAWARA, Nagoya University, TAKASHI ISHIHARA, Nagoya University, JST CREST — Direct numerical simulations of zero-pressure-gradient turbulent boundary layer (TBL) along a flat plate are used to investigate the properties of turbulent/non-turbulent interface of the TBL. The Reynolds numbers based on the momentum thickness are from 800 to 2200. The interface is defined as the set of the outermost points of the region with the absolute values of vorticity greater than $\alpha U_\infty/\delta$, where U_∞ is the free stream velocity, δ is the boundary layer thickness, and $\alpha = 0.3 - 0.7$ is used in our analysis. The analysis of conditional statistics of streamwise velocity u and spanwise vorticity ω_z near the interface shows that there is a shear (a sharp change of u) due to a sharp change of the distribution of vorticity ω_z near the interface. These results are consistent with the experiments by Semin et al. (2011). DNS data also show that the shear rate near the interface is larger when the height of the interface is smaller. Visualization of the time series of the interfaces suggests that the interfaces are moving downstream without remarkable changes in their shape during a time period of the order of δ/U_∞.

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