

Abstract Submitted
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Structure of the turbulent/non-turbulent interface of turbulent boundary layers - DNS results TAKASHI ISHIHARA, Nagoya University, JST CREST, HIROKI OGASAWARA, Nagoya University, JULIAN C. R. HUNT, University College London — Direct numerical simulations (DNS) of turbulent boundary layers (TBL) along a flat plate are used to study the properties of turbulent/non-turbulent (T/NT) interface of the TBL. The values of the momentum-thickness-based Reynolds numbers, Re_θ , used for this study, are 500 – 2200. Analysis of the conditional statistics near the interface of the TBL shows that there is a small peak in the span-wise vorticity, and an associated small jump in stream-wise velocity. It is shown that the interfacial layer has a double structure which consists of a turbulent sub-layer with thickness of the order of the Taylor micro scale and its outer boundary (super layer) with thickness of the order of the Kolmogorov length scale. An approximate profile of the conditional average of span-wise vorticity near the interface fits well to the DNS data. The velocity jump near the T/NT interface of the TBL is of the order of the rms value of velocity fluctuations near the interface. Conditional cross correlations of the stream-wise or the wall-normal velocity fluctuations change sharply across the interface, which are consistent with the blocking mechanism of the interface (Hunt and Durbin 1999).

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