

Abstract Submitted
for the DFD15 Meeting of
The American Physical Society

The time signature of the turbulent/non-turbulent interface over a turbulent boundary layer ANGELIKI LASKARI, R. JASON HEARST, ROELAND DE KAT, BHARATHRAM GANAPATHISUBRAMANI, University of Southampton — The turbulent/non-turbulent interface (TNTI) between a turbulent boundary layer and an approximately laminar free-stream is investigated with time-resolved planar particle image velocimetry (PIV). The turbulent boundary layer ($Re_\tau \approx 4000$), was formed on the floor of a water channel and was captured by a PIV system composed of a Phantom v641 4 mega-pixel camera and a Litron LDY 304 Laser. Images were acquired at 800 Hz, which was sufficient to resolve the motions of the TNTI in time. The instantaneous TNTI can be located by thresholding the velocity field based on physical arguments. A threshold of $0.95U_\infty$ can be selected based on identifying the limits of a uniform momentum zone encompassing the free-stream. The time-resolved data set allows for instantaneous tracking of the TNTI topology and detection of its convection velocity, and thus provides novel insight into the TNTI. Preliminary findings based on a sample of the data set suggest the interface is convected at a velocity between $0.6U_\infty$ and $0.7U_\infty$. The final study will include analysis of the full data set of over 400,000 time-resolved images and a more accurate estimate of the convection velocity of the interface.

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Date submitted: 24 Jul 2015

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