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Characteristics of the laminar-turbulent edge in transitional boundary layers JIN LEE, TAMER ZAKI, Johns Hopkins Univ — Characteristics of the boundary separating the laminar and turbulent regions in a transitional boundary layer are examined using a time series of three-dimensional flow fields extracted from direct numerical simulations (DNS). In order to accurately mimic boundary-layer experiments perturbed by grid turbulence, the current simulation includes the leading edge of the flat plate and the incoming homogeneous isotropic turbulence. The Reynolds number based on the momentum thickness reaches up to 1400, and high-resolution three-dimensional flow fields of the DNS data will be publicly accessible via the Johns Hopkins Turbulence Database (JHTDB). The laminar-turbulence discrimination algorithm isolates the turbulence spots within the transition zone and the bounding surface of the fully-turbulent flow. Attention is placed on the cross-stream surface between the transition zone and fully-turbulent boundary layer. The shape of this interface is dictated by a balance between downstream advection, destabilization of upstream flow and merging of turbulence spots. Conditionally sampled statistics are examined across the interface, and are also compared to the downstream equilibrium turbulent boundary layer.

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