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Large-scale structures of the turbulent boundary layer in wall-normal/spanwise plane[1] JAE HWA LEE, JIN LEE, HYUNG JIN SUNG, KAIST — Coherent wall-normal structures in turbulent boundary layer (TBL) have been investigated by scrutinizing the direct numerical simulation (DNS) dataset with Re_θ=2500. The spatial signatures of hairpin vortex legs were frequently observed in the vector fields of the wall-normal/spanwise (yz) plane and it was found that groups of such hairpin legs induce wall-normal-aligned elongated structures with a large Reynolds shear stress; this result strongly supports the typical hairpin packet model. The two-point correlation of the velocity fluctuations showed that the wall-normal length scales vary linearly with the distance from the wall and the two-point correlations between the signed swirling motions showed that interactions between counter-rotating vortices are predominant throughout the boundary layer and especially frequent in the near-wall region.

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