

Abstract Submitted  
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**Structures of turbulent boundary layers with adverse pressure gradients**<sup>1</sup> JIN LEE, HYUNG JIN SUNG, KAIST — Turbulent structures in spanwise/wall-normal plane of the turbulent boundary layers (TBLs) subjected to adverse pressure gradients (APGs) were investigated by analyzing the DNS database of Lee & Sung (2009). Probability density functions of the strength of the vortex cores normalized by their r.m.s. values displayed that strong swirling motions are frequently observed on the APG TBLs than zero pressure gradient TBLs. Influence of APGs on the population trends of spanwise vortex cores showed that those have a local maximum at the outer region for APG TBLs which might be due to the maximum Reynolds shear stress. Moreover, two-point correlations and linear stochastic estimations were scrutinized to provide statistical evidence for hairpin packet motions in the vertical plane of the TBLs with APGs. We found that wall-normal extent of the contours is elongated vertically owing to the strong swirling motion of the individual vortex located in the wake region or wake-type detached structures.

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Jin Lee  
KAIST

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