

Abstract Submitted
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Spatio-Temporal Characteristics of Coherent Structures in Shear-Dominated Flows¹ TAYGUN RECEP GUNGOR, AYSE GUL GUNGOR, Istanbul Technical University, YVAN MACIEL, Universit Laval, MARK PHIL SIMENS, Universidad Politecnica de Madrid — The energy and Reynolds stress carrying structures are investigated using three direct numerical simulation databases. The first and second databases are non-equilibrium adverse gradient pressure (APG) turbulent boundary layers (TBLs) with Re_θ reaching 8000. In the second case, the turbulent activity in the inner layer ($y/\delta < 0.1$) is artificially eliminated to examine outer of layer APG TBLs in the absence of near-wall turbulent activity. The last one is a homogeneous shear flow (HSF) database that provides information about a shear dominated flow without a wall. The turbulence statistics and structures in three flow cases are compared to understand similarities and differences between the outer layer of APG TBLs and HSF. Results of the manipulated APG TBL indicate that outer layer turbulence sustains itself when there is no turbulence activity in the inner layer and the spatial-temporal characteristics of the energetic structures are similar to the structures found in the original APG TBL. Furthermore, Reynolds stress carrying structures in the APG TBLs resemble the ones in HSF when their dimensions are scaled with the Corrsin length scale.

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