

Abstract Submitted
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Correlation structure of the Lamb vector in the outer region of a turbulent boundary layer BHARATHRAM GANAPATHISUBRAMANI, Department of Aeronautics, Imperial College London — The streamwise component of the Lamb vector (T) acts as a momentum source (for $T > 0$) or sink (for $T < 0$) in the mean-momentum balance of turbulent boundary layers. In this study, the spatial structure of T in the outer region of a turbulent boundary layer is examined by using dual-plane particle image velocimetry data. Two-point correlations of T indicate that size of source motions remain relatively constant while the size of sink motions increases with increasing wall-normal distance. Source-like motions are correlated with elongated low momentum zones that possess regions of up wash embedded within it. Momentum sinks appear to be located within low-speed regions that are within larger high momentum zones. The velocity fluctuations undergo rapid transitions between quadrants in the vicinity of sinks (i.e., both streamwise and wall normal velocity fluctuations change sign). The length scales, over which the fluctuations change sign, are larger farther away from the wall.

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