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Two-Point Cross-Spectral and POD Analysis of High Reynolds Number Zero Pressure Gradient Turbulent Boundary Layer[1] M. TUTKUN, Norwegian Defence Research Establishment, Norway, W.K. GEORGE, Chalmers University of Technology, Sweden, J.-M. FOUCAUT, S. COUDERT, M. STANISLAS, Laboratoire de Mecanique de Lille, France, J. DELVILLE, Laboratoire d'Etudes Aerodynamiques, Poitiers, France — This study reports some of the two-point cross-spectral and proper orthogonal decomposition analyzes performed on the zero pressure gradient flat plate turbulent boundary layer experiments at R_θ =9800 and 19,100. They are based on hot-wire measurements using a rake of 143 single wire probes placed in the LML wind tunnel, which has a 20 m long test section with approximately 30 cm of boundary layer thickness. Elongated correlations and their variation across the boundary layer are shown using two-point space-time correlations computed over very long records. The possible interaction between the inner and outer layer is discussed using the cross-correlations analysis and also a POD-based reconstruction of the velocity fields on a plane normal to the streamwise direction. Organization of the large scale structures on the same plane is also demonstrated using a combination of different spanwise Fourier and POD modes.

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