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Turbulence statistics in turbulent spots in a transitional boundary layer subject to free-stream turbulence BRENDAN REHILL, Stokes Institute, University of Limerick, Limerick, Ireland, ED J. WALSH COLLABORATION[1], PHILIPP SCHLATTER, LUCA BRANDT COLLABORATION[2], TAMER A. ZAKI COLLABORATION[3], DONALD M. MCELIGOT COLLABORATION[4] — Within the boundary layer transition region turbulent spots emerge and grow to form the fully-turbulent boundary layer. This paper examines the turbulent statistics within turbulent spots in a transitional boundary layer subject to free-stream turbulence intensity of 4.7%. Conditionally sampled DNS results, where the laminar and turbulent contributions to the transition region are separated, are used to obtain the relevant statistics. Conditional sampling of the data provides some improvement over the more classical time-space-averaged data reduction techniques, through providing more insight into the true turbulent statistics within turbulent spots. The statistics are compared to the lowest fully-turbulent DNS available in the literature to identify how the turbulent spots develop and form the fully-turbulent state.

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