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Scale-separation effects on the mechanisms of turbulent inertia CALEB MORRILL-WINTER, University of New Hampshire, PATHTHAGE PRIYADARSHANA, Emerson Process Management, JOSEPH KLEWICKI, University of New Hampshire — The wall-normal gradients of the Reynolds stress and turbulent kinetic energy have direct connection to the transport mechanisms of turbulent boundary layers. Moreover, these gradients can be shown to arise from the correlation between specific velocity and vorticity components. Importantly, these correlations must remain non-zero at indefinitely high Reynolds numbers if turbulent transport is also to remain a non-negligible dynamical mechanism. Such considerations motivate the investigation of the relevant velocity vorticity products under the condition of increasing scale separation. In the boundary layer, this condition occurs with increasing y^+ (at fixed Reynolds number), and more importantly, with increasing Reynolds number. In this study we continue to interrogate data from the SLTEST site in Utah's west desert to explore the behavior of the relevant velocity and vorticity component interactions at high Reynolds number, while making use of existing well-resolved laboratory data to quantify distance from the wall effects. Pre-multiplied power spectra and the associated cospectra are interpreted in the context of the known momentum source and sink behaviors of the Reynolds stress gradient.

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