Fluctuating Vorticity in Turbulent Wall Layers RONALD PANTON, University of Texas — DNS data for the correlations of fluctuating vorticity in the streamwise $\langle \omega_x \omega_x \rangle$, spanwise $\langle \omega_z \omega_z \rangle$, and normal $\langle \omega_y \omega_y \rangle$ directions is given in the various papers of Del Alamo, Jimenez, Zandonade, Moser, and Hoyas (PoF 15, L-41; JFM, 500, p135, PoF, 18, 011702 at four Reynolds numbers. Previously, APS Bulletin 53, 18, 2008 EA.00004, the inner wall region was considered. It was shown that the normal component profiles at different Reynolds numbers collapse together when scaled as $\langle \omega_y \omega_y \rangle / (u_*^4/\nu^2)$. However, the other components, $\langle \omega_x \omega_x \rangle$ and $\langle \omega_z \omega_z \rangle$, require a two-term expansion of the form $F \sim F_0 + F_1 u_* / U$. The first term scaling as $\langle \omega_y \omega_y \rangle_0 / ((u_* / \nu)^2 u_* U)$ and the second scaling as $\langle \omega_y \omega_y \rangle_1 / (u_*^4/\nu^2)$. In the outer region a completely different scaling is required. An analysis of the matching behavior between the two regions shows that the common part is a function that decreases as $1/y$. This implies that in the outer region the proper scaling is $\langle \omega_y \omega_y \rangle / [u_*^2/(hu)]$. Indeed, profiles of all three components collapse in the outer region in this variable. Furthermore, all three components show a marked tendency toward the same level and isotropic behavior.

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