## Abstract Submitted for the DFD07 Meeting of The American Physical Society

The spatial relationships between dissipation and production rates and vortical structures in turbulent boundary and mixing layers.<sup>1</sup> J.M. WALLACE, J. DIORIO, D.H. KELLEY, University of Maryland — Data bases of all three velocity components as well as six components of the velocity gradient tensor measured with multi-sensor hot-wire probes in a turbulent boundary layer and a two-stream turbulent mixing layer were analysed. The remaining three velocity gradients were determined using Taylor's hypothesis. With these data, the "instantaneous" production and dissipation rates, defined by  $P = -\partial \overline{U}_i / \partial x_i (u_i u_j)$  and  $D = -\nu \left( (\partial u_i / \partial x_j)^2 + (\partial u_i / \partial x_j) (\partial u_j / \partial x_i) \right), \text{ respectively, were determined. Cross-correlating the fluctuations of these two signals reveals significant levels of correlation$ and an asymmetric pattern that persists at several cross-stream locations for both flows. Furthermore, correlating both the dissipation and production rates with a vortex identifier,  $\omega_{x-y} = [(\omega_x)^2 + (\omega_y)^2]^{\frac{1}{2}}$ , also reveals consistent cross-stream patterns. The magnitude of these correlations and their persistent shapes across the flows suggest that regions of concentrated rates of dissipation are primarily located in the cores of quasi- streamwise vortices for both these types of turbulent shear flow, whereas regions of rates of production are more concentrated on the peripheries of the vortices .

<sup>1</sup>Phys. Fluids 19, 035101 (2007)

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