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**Pressure Rate of Strain, Pressure Diffusion and Velocity Pressure Gradient Tensor Measurements in a Cavity Shear Layer Flow**[1] XIAOFENG LIU, San Diego State University, JOSEPH KATZ, Johns Hopkins University — Pressure related turbulence statistics of a 2D open cavity shear layer flow was investigated experimentally in a water tunnel at a Reynolds number of 40,000. Time-resolved PIV sampled at 4500 fps and a field of view of 25x25 mm was used to simultaneously measure the instantaneous velocity, material acceleration and pressure distributions. The pressure was obtained by spatially integrating the measured material acceleration. Results based on 150,000 measurement samples enable direct estimates of components of the pressure-rate-of-strain, pressure diffusion and velocity-pressure-gradient tensors. The pressure and streamwise velocity correlation changes its sign from negative values far upstream from the downstream corner to positive values near the corner due to the strong adverse pressure gradient imposed by the corner. Moreover, once its sign changes, the pressure-velocity correlation preserves its positive value for the streamwise correlations, and negative value for the spanwise correlations, even after the shear layer propagates beyond the adverse pressure gradient region along both the vertical and horizontal corner walls. The pressure diffusion term is of the same order as the production rate. In the shear layer, the streamwise pressure-rate-of-strain term, $R_{11}$, is mostly negative while the perpendicular term, $R_{22}$, is positive but with a smaller magnitude, implying turbulent energy redistribution from streamwise to lateral directions.

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