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Investigation of the pressure-strain-rate correlation in the convective atmospheric surface layer KHUONG NGUYEN, SHUAISHUAI LIU, Clemson University, MARTIN OTTE, US EPA, CHENNING TONG, Clemson University — Recent studies have identified the pressure-strain-rate correlation as the main cause of surface layer anisotropy in the convective atmospheric boundary layer. We decompose the pressure field into the rapid, slow, buoyancy, Coriolis, and harmonic parts using large-eddy simulation to investigate their contributions to the pressure-strain-rate correlation. In a strongly convective surface layer, the buoyancy contribution resulting from large-scale temperature fluctuations dominates. Contributions obtained by solving the free-space Poisson equation show the same trends. The buoyancy contribution is much larger than the harmonic part, indicating that the sources terms, rather than the boundary conditions for the pressure Poisson equation are the main cause of the observed behaviors of the pressure-strain-rate. The results have implications for modeling the pressure-strain-rate correlation.

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