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Dissipation scaling in constant-pressure turbulent boundary layers[1] JOVAN NEDIC, STAVROS TAVOULARIS, University of Ottawa, IVAN MARUSIC, University of Melbourne — We use previous direct numerical simulations and experimental data to investigate the streamwise and wall-normal evolution of the dissipation parameter C_ε (namely the dissipation rate scaled by appropriate powers of the local turbulent kinetic energy and integral length scale) in the outer region of spatially evolving turbulent boundary layers. For $Re_\theta \geq 10,000$, C_ε is essentially constant in the streamwise direction, but varies measurably in the wall-normal direction. For lower Re_θ, however, C_ε changes in both directions. The constancy of C_ε is a central assumption of turbulence models based on the eddy viscosity concept and so they would inadequately represent wall bounded flows as they evolve spatially, a scenario that is common in engineering and atmospheric science applications. Accounting for the dependence of C_ε on the local Re_λ provides a means for possibly improving such models.

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