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Estimating the Bounds of the Logarithmic Layer in Adverse Pressure Gradient Turbulent Boundary Layers[1] SYLVIA ROMERO, SPENCER ZIMMERMAN, JIMMY PHILIP, JOSEPH KLEWICKI, University of Melbourne — The location of the start and end of the logarithmic layer in a zero pressure gradient turbulent boundary layer (ZPG TBL) are well-established to be $\approx 3\sqrt{\delta^+}$ and $\approx 0.15\delta^+$ (where δ^+ is the friction Reynolds number) Wei *et al.* (*J. Fluid Mech.*, vol. 522, 2005, pp. 303–327). The corresponding bounds for adverse pressure gradient (APG) TBLs are not known, as here the Clauser pressure gradient parameter $\beta \neq 0$. In this talk, we employ various tools to describe how the bounds of the inertial sublayer may behave under APG conditions, such as whether the $\sqrt{\delta^+}$ dependence for the onset of the inertial region is maintained in modest APG TBLs. The bounds of the logarithmic layer will also be discussed relative to the behavior of the mean momentum balance. Low Reynolds number large eddy simulations and newly acquired higher Reynolds number ($7000 \leq \delta^+ \leq 8000$) experimental data are used in this analysis. Hot-wire measurements are obtained at the Flow Physics Facility at the University of New Hampshire in the region of an APG ramp, where $\beta \leq 2$. The behavior of the logarithmic layer will be compared to ZPG TBL data from low Reynolds number direct numerical simulation and high Reynolds number experiments.

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