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Large-Re asymptotics of the stream-wise normal stress in the ZPG turbulent boundary layer PETER A. MONKEWITZ, Swiss Federal Institute of Technology, Lausanne, Switzerland, HASSAN M. NAGIB, Illinois Institute of Technology, Chicago, USA — Models for the stream-wise normal stress $\langle uu\rangle^+$ in wall-bounded turbulent flows have been proposed that lead to a log-law in the classical overlap layer (and part of the outer layer). Matching to the wall-layer immediately leads to $\langle uu\rangle^+_{\rm inner} \sim \ln(Re)$, i.e. to a mixed scaling in the inner layer. While this appears compatible with the observed $Re-$ dependence of the inner peak, it is shown, in the case of the ZPG TBL, to be incompatible with DNS data and the Reynolds-averaged momentum equation. Matching inner and outer expansions of $\langle uu\rangle^+$ in terms of $1/U^+_\infty$ will be presented which are consistent with experimental data and DNS, and allow extrapolation to infinite Reynolds number.

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