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Self-consistent high Reynolds number asymptotics based on the log-law for ZPG turbulent boundary layers PETER A. MONKEWITZ, EPFL Switzerland, HASSAN M. NAGIB, KAPIL A. CHAUHAN, IIT USA — The large Reynolds number behavior of flat plate turbulent boundary layers under zero pressure gradient (ZPG) is revisited. Starting from the classical two-layer approach of Millikan and Clauser with a logarithmic velocity profile in the overlap region between "inner" and "outer" layer, a fully self-consistent leading-order description of the mean velocity profile, all integral parameters and the downstream evolution of the boundary layer thickness is developed. The latter requires the knowledge of the virtual origin of the boundary layer which is determined from the Kármán equation. It is demonstrated that this self-consistent description based on the classical log-law fits all the known high Reynolds number data, and in particular their Reynolds number dependence, exceedingly well; i.e. within experimental errors.

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