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Correspondences between self-similar mean dynamics and streamwise velocity behaviors in the inertial region of the turbulent boundary layer ANG ZHOU, University of New Hampshire, JOSEPH KLEWICKI, University of New Hampshire, University of Melbourne — Self-similar mean dynamics are analytically known to exist over a well-defined inertial domain of turbulent wall-flows [Klewicki 2013, *J. Fluid Mech.* **718**, 596]. Well-resolved streamwise velocity measurements up to $\delta^+ = 20{,}000$ are used to investigate three measures of self-similarity in turbulent boundary layers, and compare their behaviors with those determined via analysis of the mean momentum equation. The measures include the Kullback-Leibler divergence (KLD) [Tsuji et al. 2005, *Fluid Dyn. Res.* **37**, 293], the logarithmic decrease of even statistical moments [Meneveau & Marusic 2013, J. Fluid Mech. **719**, R1], and the so-called diagnostic plot [Alfredsson & Orlu 2010, *Euro. J. Mech. B/Fluids* **42**, 403]. The present findings indicate that the approximately constant KLD profiles and the approximately logarithmic moment profiles follow the same scaling but reside interior to the bounds of the self-similar inertial domain associated with the mean dynamics. Conversely, the bounds of the self-similar region on the diagnostic plot correspond closely to the theoretically estimated bounds. A self-consistent physical interpretation is briefly discussed.

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