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Relating instantaneous structures and mean flow characteristics of turbulent boundary layers CHARITHA DE SILVA, JIMMY PHILIP, NICHOLAS HUTCHINS, IVAN MARUSIC, University of Melbourne — Recent works have highlighted the presence of thin interfacial layers of high shear that demarcate regions of relatively uniform streamwise momentum in turbulent boundary layers. Here, we aim to further our understanding of how such a zonal-like structural arrangement manifests in the averaged flow statistics. To this end, we start by identifying high shear interfaces in turbulent boundary layers employing particle image velocimetry databases that span more than an order of magnitude of friction Reynolds number ($Re_\tau = 10^3$–10^4). Inspection of these recurrent features reveal that their geometry is highly contorted and exhibits self-similarity across a wide range of scales. The Reynolds number dependence of these features is also investigated, together with their associated scaling. Based on these findings and the persistent presence of sharp changes in momentum in turbulent boundary layers, a simple model is presented towards reconstructing the mean velocity profile.

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