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Structure of Canonical Turbulent Wall-Bounded Flows MATTHIAS H. BUSCHMANN, Technische Universität Dresden, Germany, MOHAMED GAD-EL-HAK, Virginia Commonwealth University, U.S.A. — To properly describe wall-bounded turbulent flows, a general idea on the structure of this type of flow is needed. In this talk, we focus on two-dimensional channel flows and zero-pressure-gradient boundary layers. Expanding on the idea advanced by Klewicki et al. (*J. Fluid Mech.* **222**, pp. 303–327, 2004), we analyze the continuity, mean momentum and transport equation of turbulence kinetic energy using channel DNS data. The outcome of this analysis is that the classical two-layer approach is physically most convincing and, for practical purposes (e.g., derivation of mean-velocity profile), most efficient approach. Several scaling schemes have been suggested based on the two-layer idea. In this presentation, we apply the Zagarola–Smits scaling—originally proposed based on empirical ground for the outer representation of pipe flows—to different types of canonical wall-bounded flows. A new suggestion to apply this scaling for the inner representation of the mean-velocity profile is made and successfully applied.

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