

Abstract Submitted
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The rough-wall turbulent boundary layer revisited P. HENRIK ALFREDSSON, ANTONIO SEGALINI, Linné FLOW Centre, KTH, IAN P. CASTRO, University of Southampton — The turbulent boundary layer over a rough wall is a canonical flow case that, despite its long history, is still a subject of numerous debates regarding its appropriate scaling and the physical phenomena involved. In a recent paper¹ a novel empirical scaling, based on the so called diagnostic plot, has been proposed to describe the streamwise velocity variance profile for rough-wall conditions. The scaling gives the turbulence intensity as a function of the local mean velocity and of the roughness function, ΔU^+ , regardless of the specific roughness morphology. The analysis is reviewed and extended to other components of the stress tensor, with the aim of providing a simple description of the turbulence statistics over rough surfaces and to establish a connection between rough and smooth surfaces beyond Townsend's hypothesis. Several independent experiments and numerical simulations are used for this purpose. Such an estimation of the turbulence statistical characteristics will be useful for model validation and for a variety of applications that range from wind energy to micrometeorology.

¹Castro, I.P., Segalini, A. & Alfredsson, P.H. 2013 Outer-layer turbulence intensities in smooth- and rough-wall boundary layers, *J. Fluid Mech.* **727**, 119–13

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