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Turbulent boundary layers over a systematically varied rough wall[1] MICHAEL SCHULTZ, KAREN FLACK, U.S. Naval Academy — Results of an experimental investigation of the flow over a model roughness are presented. The series of roughness consists of close-packed pyramids in which both the height and the slope are systematically varied. The aim of this work is to gain insight into the physical roughness scales which contribute to drag. The mean velocity profiles for all nine rough surfaces collapse with smooth-wall results when presented in velocity-defect form. The Reynolds stresses also show good agreement with smooth-wall results outside the roughness sublayer when presented in outer variables. The results for the six steepest surfaces indicate that the roughness function, ΔU^+, scales almost entirely on the roughness height with only a weak dependence on the slope of the pyramids. However, $\Delta U^+$for the three surfaces with the smallest slope does not scale on the roughness height, indicating that these surfaces might not be thought of as surface 'roughness' in a traditional sense but instead surface 'waviness'.

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