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Prediction of Frictional Drag over Rough Walls using Surface Statistics[1] KAREN FLACK, MICHAEL SCHULTZ, United States Naval Academy
— Although the frictional drag of rough-wall-bounded flows has been studied extensively, several practical questions remain largely unresolved. First, the relationship between the shape of the roughness function in transitionally-rough regime and the surface topography which gives rise to it are not well understood. Second, it is not completely clear which textural parameters best describe a rough surface in a hydraulic sense. Furthermore, the range of roughness wavelengths that influence the skin-friction is not well established. The focus of the present work is to attempt to address these questions with a systematic study of the skin-friction of fifteen rough surfaces that were generated by grit blasting. The hydrodynamic tests were carried out over a large Reynolds number range. Five surfaces were prepared by grit blasting with a single scale blast media. These underwent hydrodynamic testing and were subsequently blasted with secondary and tertiary scale media in order to investigate the role that the incorporation of additional roughness length scales plays in determining the shape of the roughness function and the resulting hydraulic length scale. The presentation will focus on the appropriate statistical scales for prediction of the roughness function. Spatial filtering prior to the calculation of surface statistics will also be discussed.

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