

Abstract Submitted  
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**Investigation of wall-bounded turbulence over sparsely distributed roughness** MARCO PLACIDI, BHARATH GANAPATHISUBRAMANI, University of Southampton — The effects of sparsely distributed roughness elements on the structure of a turbulent boundary layer are examined by performing a series of Particle Image Velocimetry (PIV) experiments in a wind tunnel. From the literature, the best way to characterise a rough wall, especially one where the density of roughness elements is sparse, is unclear. In this study, rough surfaces consisting of sparsely and uniformly distributed LEGO<sup>®</sup> blocks are used. Five different patterns are adopted in order to examine the effects of frontal solidity ( $\lambda_f$ , frontal area of the roughness elements per unit wall-parallel area), plan solidity ( $\lambda_p$ , plan area of roughness elements per unit wall-parallel area) and the geometry of the roughness element (square and cylindrical elements), on the turbulence structure. The Karman number,  $Re_\tau$ , has been matched, at the value of approximately 2300, in order to compare across the different cases. In the talk, we will present detailed analysis of mean and rms velocity profiles, Reynolds stresses and quadrant decomposition.

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