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Characteristics of secondary flows in rough-wall turbulent boundary layers CHRISTINA VANDERWEL, BHARATHRAM GANAPATHISUBRAMANI, University of Southampton — Large-scale secondary motions consisting of counter-rotating vortices and low- and high-momentum pathways can form in boundary layers that develop over rough surfaces. We experimentally investigated the sensitivity of these secondary motions to spanwise arrangement of the roughness by studying the flow over streamwise-aligned rows of elevated roughness with systematically-varied spacing. The roughness is created with LEGO blocks mounted along the floor of the wind tunnel and Stereo-PIV is used to measure the velocity field in a cross-plane. Results show that the secondary flows are strongest when the spanwise spacing of the surface topology is comparable with the boundary layer thickness. We discuss how these results are relevant to flows over arbitrary topologies and how these secondary motions influence the Reynolds stress distribution in the boundary layer.

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