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Impact of spanwise effective slope on near-wall turbulence
THOMAS JELLY, NICHOLAS HUTCHINS, University of Melbourne, ANGELA BUSSE, University of Glasgow — Whereas streamwise effective slope (ES) is widely accepted as a key scaling parameter in the context of rough-wall turbulent flows (Napoli et al., *J. Fluid Mech.*, **613**:385-394, 2008), spanwise ES has received far less attention. Here, the statistical response of near-wall turbulence to systematic changes in spanwise ES is investigated by performing direct numerical simulations of rough-walled turbulent channel flow at a friction Reynolds number of 395. For the seven irregular surfaces considered in this study, the spanwise ES ranges from 0.35 to 0.10. All surfaces were synthesised with a near-Gaussian height distribution, i.e. negligible skewness and excess kurtosis, and a streamwise ES equal to 0.35. This allows the current study to focus on the impact of spanwise ES, since skewness, kurtosis and streamwise ES have been all effectively been eliminated as parameters. Starting from a baseline isotropic case, the hydraulic and hydrodynamic properties of each surface are compared as a function of spanwise ES. Details related to the Hama roughness function, turbulence intensities and dispersive stresses will be presented and discussed. Preliminary results from a complementary experimental campaign will also be presented.

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