Documentation for Research Dataset

Introduction

This dataset contains velocity data for the following article:
Zhdanov O., Jelly T.O. and Busse, A. (2025) Impact of windward and effective slope on the roughness effect of ratchet-type surfaces in turbulent channel flow. International Journal of Heat and Fluid Flow (doi: 10.1016/j.ijheatfluidflow.2025.109897)

Surfaces

The geometric definition of the surfaces with triangular ridges can be found in the article.

Dataset

A velocity data file is provided for each group of surfaces. The naming convention is as follows: for each group of surfaces, the files are named VelocityData_Group_*.csv where * is replaced by the name of the surface group. Each file contains mean velocity profiles for all surfaces within the corresponding group. Also provided are data for the smooth-wall reference case.

Table 1 gives an overview of the column layout. For the computation of the velocity data intrinsic averaging was applied, i.e., averages are taken over the fluid occupied area only. All velocity data are normalised with the friction velocity u_τ which is based on the constant mean streamwise pressure gradient and the channel half-height δ.

Table 1 Column layout for velocity statistics files

Column	Contents	Comments
1	z/δ	Wall-normal location
2:end	$\langle\bar{u}\rangle/u_\tau$	Mean velocity for each surface in the group. The surface ID is provided in the first cell of each column.

Further information

In case of questions about this dataset, please contact the authors.