

Documentation for Research Dataset

Introduction

This dataset contains velocity data for the following article:

Sarakinos, S. and Busse, A. (2023) Reynolds number dependency of wall-bounded turbulence over a surface partially covered by barnacle clusters, *Flow, Turbulence and Combustion* (2023) (doi:10.1007/s10494-023-00495-2).

Surfaces

The geometric definition of the barnacle surface is given in the file barnacle10pc.csv

Surface data for the Gaussian surface can be found in the Enlighten Research Data Repository under Datacite DOI: 10.5525/gla.researchdata.889

Velocity statistics

Separate velocity statistics files are provided for each case listed in Table 2 and Table 3 of the article. The naming convention is as follows: VelocityData_barnac_*.csv where * is replaced by the name of the corresponding case in the table.

Table 1 gives an overview of the column layout for the velocity statistics files. 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 calculated based on the constant mean streamwise pressure gradient and the mean channel half-height δ .

Velocity statistics for the Gaussian surface can be found in in the Enlighten Research Data Repository under Datacite DOI: 10.5525/gla.researchdata.889

Table 1 Column layout for velocity statistics files

Column	Contents	Description
1	z/δ	Wall-normal location
2	$\langle \bar{u} \rangle^+$	Mean streamwise velocity
3	$\langle \overline{u'u'} \rangle^+$	Streamwise normal Reynolds stress
4	$\langle \overline{v'v'} \rangle^+$	Spanwise normal Reynolds stress
5	$\langle \overline{w'w'} \rangle^+$	Wall-normal Reynolds stress
6	$\langle \overline{u'w'} \rangle^+$	Reynolds shear stress
7	$\langle \tilde{u}\tilde{u} \rangle^+$	Streamwise dispersive stress (<i>not applicable for smooth-wall cases</i>)
8	$\langle \tilde{v}\tilde{v} \rangle^+$	Spanwise dispersive stress (<i>not applicable for smooth-wall cases</i>)
9	$\langle \tilde{w}\tilde{w} \rangle^+$	Wall-normal dispersive stress (<i>not applicable for smooth-wall cases</i>)
10	$\langle \tilde{u}\tilde{w} \rangle^+$	Dispersive shear stress (<i>not applicable for smooth-wall cases</i>)

Further information

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