# Documentation for Research Dataset

## Introduction

This data set contains mean and fluctuating aerodynamic coefficients, Strouhal number, recirculation region length, wake width, and energy contributions of the first 20 POD modes for all considered angles of attack from large eddy simulations and recirculation region length from PIV experiments for the following article:

Zhdanov, O., Green, R. and Busse, A. (2022) LES and PIV investigation of the flow past a cactus-shaped cylinder with four ribs. *Flow, Turbulence and Combustion* (doi: 10.1007/s10494-022-00386-y)

## Dataset

A separate file is provided for numerical (LES) and experimental (PIV) data. The naming convention is as follows: `*_data.csv`, where `*` is replaced by the `LES` for data from large eddy simulations or `PIV` for experimental data.

Table 1 provides an overview of the column layout for the LES data file. Mean and fluctuating aerodynamic coefficients and Strouhal number are based on the projected frontal area and width of the cactus-shaped cylinder, respectively. Recirculation region length and wake width are normalised by the cactus-shaped cylinder width.

*Table 1 Column layout for LES data file*

| Column | Contents | Comments |
|---|---|---|
| 1 | $\alpha$ | Angle of attack in degrees |
| 2 | $C_D$ | Mean drag coefficient |
| 3 | $C_L$ | Mean lift coefficient |
| 4 | $C_L'$ | Fluctuating lift coefficient |
| 5 | $St$ | Strouhal number |
| 6 | $L_r/D$ | Recirculation region length |
| 7 | $W/D$ | Wake width |
| 8-27 | POD mode energy | Energy contributions of the first 20 POD modes |

Table 2 provides an overview of the column layout for the PIV data file. Recirculation region length is normalised by the cactus-shaped cylinder width.

*Table 2 Column layout for PIV data file*

| Column | Contents | Comments |
|---|---|---|
| 1 | $\alpha$ | Angle of attack in degrees |
| 2 | $L_r/D$ | Recirculation region length |

## Further information

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