The TUHH Open Research (TORE) repository contains the raw and processed data underlying the publication "Lagrangian µ-Particle Tracking Velocimetry Analysis of Microscale Flow over Structured Surfaces". The dataset includes experimental particle tracking velocimetry (PTV) data, the design files of the investigated structured surfaces, and the corresponding MATLAB analysis scripts. The study investigates flow over micro- and nanostructured surfaces as a basis for improving (bio)reactor design, with a focus on mass transport near the surface. µ-PTV was used to obtain three-dimensional, time-resolved particle trajectories and velocity fields in a microreactor. The Lagrangian analysis shows that rectangular microgrooves increase particle contact with the wall. In particular, when the microgrooves are oriented perpendicular to the flow. The analysis reveals near-surface phenomena such as particle trapping and localized recirculation that are not captured by averaged Eulerian velocities alone.

Folder Structure

- Root
  - Scripts — General scripts required for processing in MATLAB
  - Reference_plate
    - Raw_data — Trajectory data exported from DaVis 11.2 after Shake-The-Box analysis (.dat)
    - Processed_data
      - Eulerian — Time-averaged velocity fields (.mat)
      - Lagrangian — Trajectories (.mat)
      - Scattered_Interpolants — Scattered velocity interpolants for each time step (.mat)
  - Structured_plate_with_parallel_microgrooves
    - Raw_data — Trajectory data exported from DaVis 11.2 after Shake-The-Box analysis (.dat)
    - Processed_data
      - Eulerian — Time-averaged velocity fields (.mat)
      - Lagrangian — Trajectories (.mat)
      - Scattered_Interpolants — Scattered velocity interpolants for each time step (.mat)
  - Structured_plate_with_perpendicular_microgrooves
    - Raw_data — Trajectory data exported from DaVis 11.2 after Shake-The-Box analysis (.dat)
    - Processed_data
      - Lagrangian — Trajectories (.mat)