

Bachelor/Master's Thesis Opportunity

Interaction between Turbulence and Scalar Transport near the wall using 2D-PIV and Tracer PLIF

Motivation:

Wall-bounded turbulence at high Reynolds numbers plays a critical role in various engineering applications, including engine walls, aircraft wings, and submarine surfaces. Understanding Reynolds number scaling in active-wall flows is essential for accurate modeling and prediction. Traditionally, research has focused on the inertial (logarithmic) region of boundary layers. However, recent findings highlight the significant interaction between walls and scalars with different boundary conditions, making this topic highly relevant. Optical measurement techniques have become essential in turbulence research, enabling non-intrusive acquisition of key physical parameters such as velocity, temperature, and gas concentration. In this thesis, Particle Image Velocimetry (PIV) and Planar Laser-Induced Fluorescence (PLIF) will be used to measure velocity fields, concentration distributions, and temperature profiles simultaneously.

Objectives:

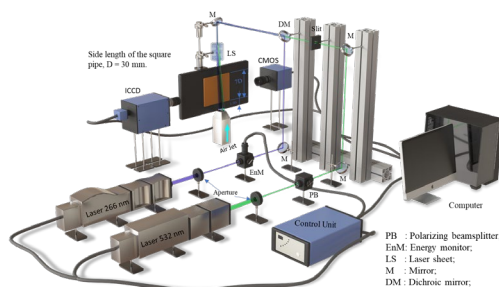
The experimental setup and optical measurement platform are already in place. The candidate will familiarize themselves with the experimental measurement techniques, and conduct velocity and concentration distribution measurements in various wall turbulence scenarios under the supervision of the instructor, and analyze the physical implications of the measurement data based on your fundamental understanding of turbulence theory and optical diagnostics. This thesis offers an excellent opportunity to gain hands-on experience with state-of-the-art optical measurement techniques in turbulence research while contributing to a highly relevant field of study. The work must be recorded in written form. The results will be presented as part of an EBI-VBT seminar.

Requirements

Background in fluid mechanics, turbulence, or optical diagnostics.

Experience with experimental measurements (PIV, PLIF, or similar methods is a plus).

Good written and verbal communication skills in English.



Aufgabensteller:

Betreuer:

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