

Bachelor's or Master's Thesis

Non-intrusive temperature determination in flames and reactors using laser absorption spectroscopy

Motivation

Temperature is a key state variable in flames and reactors and strongly influences reaction kinetics, emission formation, and process stability. However, its reliable, non-intrusive measurement remains a challenge. Tunable diode laser absorption spectroscopy (TDLAS) enables non-intrusive temperature quantification based on temperature-dependent H_2O absorption lines. At the Engler-Bunte Institute, a TDLAS system has been developed and is further adapted and applied to new experimental questions within the scope of this work.

Project description

The objective of this work is the experimental investigation of temperature fields in flames or reactors using an existing TDLAS system. In addition to conducting the measurements, the study includes the adaptation and further development of the optical setup and data evaluation routines to accommodate different experimental conditions. The acquired measurement data are analyzed, interpreted, and physically assessed. The specific focus of the work can be flexibly adjusted depending on individual interests, start date, and project progress.

Tasks

- Literature review on TDLAS
- Execution and analysis of TDLAS measurements
- Adaptation of the TDLAS measurement setup to different flame and reactor geometries
- Optimization of measurement strategy, spectral line selection, and optical configuration
- Analysis of the influence of varying operating conditions on temperature fields
- Comparison of different flame or reactor configurations
- Documentation and critical assessment of the measurement methodology, measurement uncertainties, and obtained results

Background knowledge

Students of engineering or related fields. Previous experience in optical measurement techniques is helpful but not required. An interest in experimental work and/or data analysis is expected.

Date, location

Starting immediately, Campus South

Contact

If you are interested, feel free to contact us:

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