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HiWi/WiHi student job

Experimental and numerical investigations of laminar burning velocities of refrigerants

Because of their high global warming potential (GWP), hydrofluorocarbon refrigerants are now systematically removed from the market. Replacements with low GWP exist but give rise to safety hazards as they are found to be mildly flammable. Hence, a fundamental understanding of their combustion behavior is needed. One property to describe the fundamental combustion behavior for safety evaluation is the laminar burning velocity, which considers the combined effects of diffusivity, exothermicity, and reactivity. While accurate data are critical for a reliable safety assessment of such refrigerants, the experimental facilities need to be also practical and robust for industry usage.

In this student job, the standard methods used in the refrigeration industry to determine the laminar combustion rates of refrigerants will be analyzed and improved. High accuracy Particle Image Velocimetry (PIV) and schlieren experiments will be performed to determine the limits of operation, supported by CFD simulations. New post-processing methods will also be developed for the experiments. Subsequently, based on the knowledge gained, a modified, well-validated burner design will be developed for easy implementation in industry.

Tasks

- Familiarize with experiment and simulation
- Perform Schlieren and PIV experiments
- CFD simulations of combustion processes
- Further development of evaluation methods

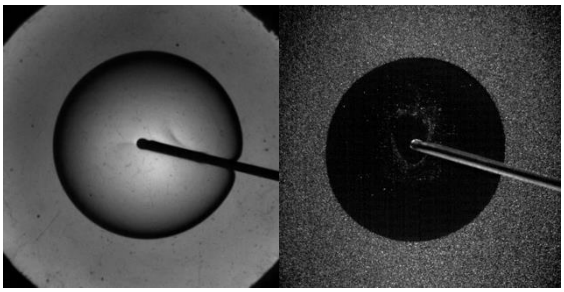

Figure 1: Visualization of a CH_4/air flame by Schlieren (left) and PIV (right).

Requirements:

- Interest in experiments and simulation
- Reliability, independence, motivation
- Knowledge in thermodynamics, fluid mechanics and combustion desirable
- Programming skills desirable

The student job can be the basis for a future thesis.
For your application, please send a CV and your grade sheet to the contact below.

Contact

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Please refer to our website for further information:
https://itv.rwth-aachen.de/