

Master-Thesis/Bachelor-Thesis/ADP/Hiwi

Experimental Investigation of Premixed Combustion in a Porous Media Burner for High-power and Low-emission Energy Applications

Motivation & Background

As emission regulations tighten and policies evolve to address global climate change, reducing pollutant and greenhouse gas emissions has become a top priority in combustion research. The advanced combustion concept of matrix-stabilized combustion is essential for achieving low emissions and improved flame stabilization in fuel-lean conditions. Combustion within an inert porous matrix differs significantly from conventional burners that use a free flame. Porous media burners (PMBs) rely on the principle that the solid porous matrix internally recirculates heat from combustion products back to the reactants. This internal heat recirculation in PMBs lowers the lean flammability limit of fuel-air mixtures, enabling lower emissions, reduced thermal stresses due to lower flame temperatures, and complete fuel conversion through lean combustion. However, stabilizing these flames within the porous matrix poses challenges due to the complex thermophysical, transport, and heat-transfer processes involved.

The objective of this project is to install a well-designed PMB in the RSM laboratories and perform the first experimental investigation using different pore structures and fuel mixtures.

Tasks

- Review the literature on porous media combustion
- Install the PMB and components for ignition tests
- Investigate the flame stability using different pore media structures and fuel/air mixtures
- Measure the pollutant emissions, e.g. NO
- Analyze data and results
- Intermediate and final presentations, complete the final thesis

Focus areas

- | | |
|---------------|-------|
| Experiment | ● ● ○ |
| Construction | ● ● ○ |
| Modeling | ● ○ ○ |
| Data analysis | ● ● ○ |

Date

27.06.2024

Start from

Flexible, get in touch!

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