



TECHNISCHE
UNIVERSITÄT
DARMSTADT

Master-Thesis / Bachelor-Thesis / ADP

Development and characterization of a fiber coupling system for mid-infrared free-space lasers

Entwicklung und Charakterisierung eines Faserkopplungssystems für Freistrahllaser im mittleren Infrarotbereich

Motivation:

Climate change and rising health concerns have led to increasingly strict regulatory emission standards for combustion engines over the past few years.

In order to investigate the compliance with these regulations, special measurement techniques are required. Specifically, in the context of Real Driving Emissions (RDE), compact systems that allow for in situ measurement at engine tailpipe are necessary.

Tunable diode laser absorption spectroscopy (TDLAS) is a measurement technique well suited for this task, as it allows simultaneous high speed in-situ measurement of a variety of gases. A large benefit of this technique is the application of small diode lasers which can be connected via glass-fibers and thus allowing for very small measurement devices outside the vehicles.

The extension of the regulatory requirements made the implementation of new free-space diode lasers necessary, which are not yet fiber-coupled and thus cannot be connected to existing hardware.

The goal of this work is the development and application of a fiber-coupling system for these free space mid-infrared diode lasers.

Tasks:

- Literature research & get familiar with the topic
- Concept development for fiber coupling of free beam lasers in the mid infrared range
- Simulation of the concept in Virtual Lab Fusion
- Concept implementation in the laboratory
- Characterization of the implemented fiber coupling system
- Experimental measurements on a test bench
- Intermediate and final presentations, writing your thesis

Requirements:

- Interest in lab work
- Independent working
- Basic knowledge in optical metrology is preferred

Are you interested? Feel free to contact us!

Start: immediately

Reaktive Strömungen und
Messtechnik (RSM)

Reactive Flows and
Diagnostics



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