

Bachelor or Master Thesis

Investigation of Coalescence Mechanisms of Picolitre Drops on Fibers with High-Speed Camera and Self-Developed Tools for Image Analysis

Motivation:

In mist filtration, fiber-based coalescers are an established form of filtering droplets contained in mist. The filtration process can be divided into different process steps, describing the impact of the droplets on fibers, the formation of fluid structures and the liquid transport. An essential mechanism of fluid formation is the coalescence of smaller droplets into larger droplets - hence the name coalescing filter.

Contents

In order to investigate mechanisms inside depth filters on a microscopic level, investigations are often reduced to single fibers. To ensure application-oriented investigations, droplet volumes in the picolitre range are selected on fibres with a diameter of 40 - 100 μm . The handling of these media on a microscopic level is a major challenge of the experiments. The mechanisms of coalescence are to be identified using state-of-the-art high-speed optics and self-programmed tools for image analysis including object tracking and contact analysis (MATLAB or Python) .

Depending on the dimensionless parameters, various behaviours of the coalescing droplets are to be expected. Droplets can detach from the fibre due to the resulting momentum (self-propelled droplet jump), start to drain (on a vertical fibre), bounce off each other when moving relative to each other (droplet bounce) or simply unite under oscillation to form a larger droplet. Im nächsten Schritt wird das Bewegungs- und Koaleszenzverhalten einzelner Tropfen auf einer mechanisch angeregten (vibrierenden) Faser untersucht.

If you are generally interested in micro fluidics, filtration and Image postprocessing I would be happy if you send me an email or give me a call. Afterwards, we can work together to align the thesis according to your interests and wishes.

What I can offer you:

- I maintain an intensive mentoring relationship with my students with regular appointments (if requested) and I'm always available to support with problems
- I give my students the freedom to contribute their own ideas to the final project
- The thesis is your work and not mine, which is why I prefer to be your advisor and not to interfere too much

Your tasks

- Depending on the specific topic CAD modelling of 3D-printed parts for the test rig
- Developing an understanding for optical systems
- Development of tools for image analysis
- Creation and tracking of a project plan for your thesis

What should you bring to the job

- Having fun to try and learn new things
- Ability to communicate
- goal-oriented working
- Basic knowledge of C++, MATLAB or Python is beneficial

Start time: now

Type of work: Experimental & Programming

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