Karlsruhe Institute of Technology

Bachelor Thesis

Investigation of Flow Around a Small Cylinder within a Flow Channel Using Computational Fluid Dynamics Simulation

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. In order to investigate mechanisms inside depth filters on a microscopic level, investigations are often reduced to single fibers. Therefore, a single fibre was placed inside a flow channel for experimental analysis.

Contents

In the context of this bachelor thesis, the flow within the flow channel is to be simulated. The focus of the study is on analyzing potential vortices within the flow and proposing improvements to the flow channel geometry. Furthermore, the flow around the fiber in the flow channel and around the fiber with a droplet sitting on it is to be investigated. The results obtained from the simulations will be validated through experimental studies using mist and literature values.

The implementation has to be done with ANSYS Fluent, a commercial CFD-Software.

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

- Developing an understanding for CFD-Simulations
- Development of a numerical routine for the task
- 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 computational-fluid-dynamics is a plus

Start time: now

Type of work: Experimental & Programming

Contact: Alexander Schwarzwälder, M.Sc.
E-Mail: alexander.schwarzwaelder@kit.edu
Tel.: +49 721 608-46573