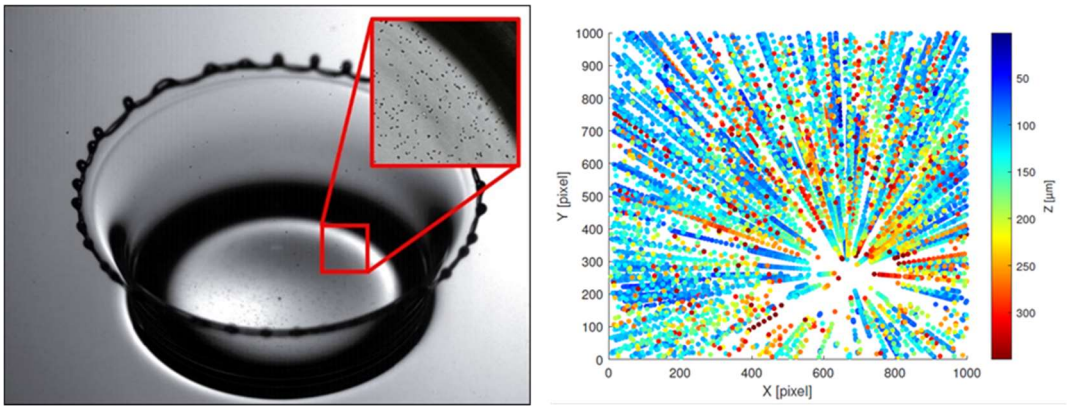
Universität Stuttgart
INSTITUT FÜR THERMODYNAMIK DER LUFT- UND RAUMFAHRT
Direktor: Professor Dr.-Ing. B. Weigand
Pfaffenwaldring 31, 70569 Stuttgart, Germany · http://www.itlr.uni-stuttgart.de

17.02.2025

Bachelor / Master Thesis

Experimental setup (film seeding) and investigation of droplet impact on thin films using the DPTV measurement method

The research group on Droplet Dynamics at the Institute of Aerospace Thermodynamics (ITLR) of the University of Stuttgart is seeking an engaged and motivated Bachelor or Master student for the DROPIT subproject SP-C1/C5. The objective of the thesis is to investigate macroscopic and microscopic flow phenomena during the impact of droplets on thin liquid films. The rapid liquid movements and unsteady processes within the thin film pose significant challenges for precise measurement techniques. A previously developed method, Defocusing Particle Tracking Velocimetry (DPTV), employs particles (seeding) mixed into the droplet. Their motion is captured using a high-speed camera, enabling two-dimensional tracking of particle movement and mapping to X- and Y-coordinates. Additionally, the particle depth position (Z) is determined along the optical axis using the defocusing effect of depth of field.



The aim of the thesis is to develop an experimental setup that allows seeding of the liquid film. This will enable detailed investigation of droplet impact, facilitating the analysis of film flow and providing deeper insights into the underlying dynamic processes.

Task:

- Literature review and familiarization with the topics of droplet dynamics, film seeding and DPTV
- Develop the experimental setup for film seeding and perform experiments on the test rig
- Analyze data using existing MATLAB routines and further develop analytical models
- Further development and implementation of existing evaluation routine
- Write a detailed thesis and present the results in a final presentation

Requirements:

- Enrolled student in a natural science or engineering program
- Proficient in German or English, both written and spoken
- Programming skills in MATLAB or a comparable programming language

Duration/Scope:

- Starting immediately
- The work is to be carried out at the ITLR and should be completed within 4-6 months.

If interested and for further information

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https://www.project.uni-stuttgart.de/dropit/research/ta-c_drop_liquid_interaction/