Karlsruhe Institute of Technology

Institute of Fluid Mechanics
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Master-Thesis – Post-processing

Volumetric Reconstruction of the phase boundary during a drop impact

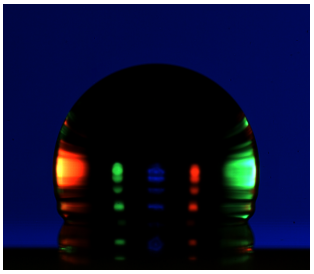
Background

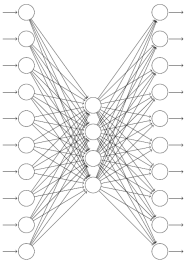
The impact of liquid droplets is a key process for a wide range of technical applications, for example spray cooling and coating. A commonly used optical measurement method for the observation of drop impact dynamics is the shadowgraphy technique, wherein the falling droplet is illuminated in backlight, mapping the contour of the droplet accurately and therefore allowing for the determination of the gas-liquid interface. However, these measurements provide only a two-dimensional representation of the drop shape, whereas the drop dynamics is inherently three-dimensional. While numerical simulations can deliver a three-dimensional representation of the droplet, they rely on experimental data for validation. Therefore at the Institute of Fluid Mechanics a test rig based on the shadowgraphy technique was set up, which captures additional three-dimensional information of the droplet by using light sources with different colors to produce highlights on the droplet surface.

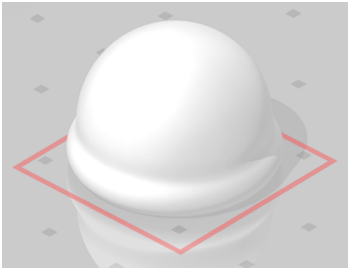
Content of the Thesis

Within the scope of this master thesis, a neural network based algorithm for the volumetric reconstruction of the droplet is to be developed with the scope of a high spatial accuracy of the reconstruction. The quality of the reconstruction is to be compared with conventional algorithms.

- Research of conventional and deep learning methods for volumetric reconstruction
- Development of a deep learning reconstruction algorithm
- Evaluation of the reconstruction accuracy







Requirements:
Good knowledge of fluid mechanics and programming

Beneficial Skills:
Experience in Python and image processing

Start: immediately

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