

Prof. Dr. Malte Jaensch
Fluid Dynamics, Machine Learning

Master Thesis

Evaluation of X-Ray CT Fluid Distribution Measurements using Machine Learning

Description

A novel measurement technique for oil distribution in directly cooled drivetrain components using medical X-ray CT is being developed in our lab. The idea is to establish a quantitatively reliable measurement for 3D oil distribution in closed, highly dynamic systems. Measurements have been performed to prove the concept. The next step is a robust evaluation of the measurements with respect to surface wetting, density distribution, aeration, and related factors to align them with the CFD simulation output parameters. Analytical approaches have been explored and found to work, but exhibit limitations. In this thesis, the alternative path via machine learning shall be explored. The goal is to develop, train, and validate a neural network that can detect dry and wet surfaces from real CT measurements and compensate for measurement artifacts.

Tentative Tasks

- Independent literature research regarding (medical) X-ray computed tomography and ML
- Develop a neural network suitable to extract the required quantities
- Create a training dataset for the network (CT- and CFD-simulation tools + HPC is available)
- Train and validate the network

Requirements

- (ideally advanced) knowledge about modern ML
- Solid foundation in Python
- Basic knowledge about the automotive electric drivetrain
- Fluent English

Start

Any time from now

Contact

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We are looking forward to your application, including a CV and Transcript of Records