

2 theses (Bachelor's/Master's as teamwork)

Design, construction, and performance evaluation of cryogenic heat pipes and CFD simulation of heat transfer in cryogenic heat pipes

Contents:

Heat pipes are heat exchangers that utilize the evaporation enthalpy of a fluid in a closed pipe to achieve a high heat flux density with a comparatively small cross-sectional area. For the use of cryogenic energy sources (liquid hydrogen and liquid methane, or liquid natural gas), cryogenic heat pipes with operating temperatures below -150 °C and liquid nitrogen as the working medium would be of interest for a wide variety of applications. As part of **two theses**, heat pipes for use at temperatures below -150 °C are to be designed, built, and tested. One thesis will address the construction and operation of the cryogenic heat pipes, and the second thesis will address a CFD simulation of the heat pipe in order to ultimately compare the experiment and the simulation.

Tasks 1. Thesis:

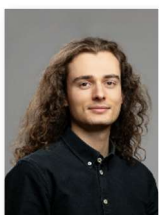
- Extensive literature research on heat transfer using heat pipes, material issues, and measurement technology in the low-temperature range
- Design of heat pipes based on process- and safety-related conditions
- Construction of the previously designed heat pipes
- Setup of a test bench for performance evaluation of the constructed heat pipes
- Written documentation of the work, preparation, and presentation of the results

Tasks 2. Thesis:

- Extensive literature research on CFD simulation of heat pipes and material data, capillary structures, and low-temperature material data.
- Analysis of various fluids and capillary structures using CFD simulations
- Design and construction of the heat pipe based on process- and safety-related conditions and on the optimal combination of fluid and wick
- Written documentation of the work, preparation, and presentation of the results

Requirements

- Good understanding of heat transfer mechanisms and fluid dynamics
- Ideally, initial experience with CFD simulations or heat pipes
- Language: German or English



Start of work: ongoing

Contact:

Niklas Hehmke, M.Sc.

Telefon: +49 911 5302 99024

E-Mail: niklas.hehmke@fau.de

