Friedrich-Alexander-Universität
Technische Fakultät

Department of Chemical and
Biological Engineering (CBI)
Chair of Energy Process Engineering
Prof. Dr.-Ing. Jürgen Karl

Thesis (Bachelor/Master)

Characterization of additively manufactured porous metal structures to determine their capillary performance in liquid sodium

Content:

Heat pipes are heat exchangers that utilize the evaporation enthalpy of a medium to enable a high heat flux density with a comparatively small cross-sectional area. A critical aspect here is the return of the fluid from the condenser to the evaporator, which is achieved with the aid of capillary structures. For high-temperature applications, liquid sodium has proven itself as a heat transfer fluid due to its favorable thermophysical properties.

With the ongoing development of additive manufacturing ("3D printing") of metal materials, new possibilities for the production of heat pipes are also emerging. The additive manufacturing of heat pipes, including the capillary structure, promises increased thermal performance compared to conventional manufacturing methods through the realization of complex shapes and improved material connections.

Tasks:

- Literature research on heat pipes, fluid mechanics, and measurement technology
- Construction of a test rig for determining capillary performance
- Preparation of material samples and subsequent characterization
- Written documentation of the work, preparation, and presentation of the results

Prerequisites:

- Basic knowledge of fluid mechanics and measurement technology
- Ideally, experience in laboratory operations
- Working language: German or English

Start of thesis work: ongoing

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