

Prof. Dr.-Ing. Jörg Starflinger Chair of Nuclear Technology and Reactor Safety

Objective:

The goal of this project is to develop a simplified analytical model of a heat pipe. The modelling will begin with a lumped-parameter approach and progressively incorporate greater detail to capture the key physical phenomena occurring within the heat pipe.

Background:

As part of the "MISHA – Passive Cooling of Innovative Micro Nuclear Reactors" project, this research aims to evaluate the heat transport capabilities of high-temperature heat pipes. Several experiments have already been conducted on different heat pipe prototypes. To better interpret the experimental data and gain deeper insight into the system's behaviour, a simplified representative analytical model is required.

Approach:

- Conduct a literature review on relevant topics such as contact angle, effective pore radius, capillarity, and molten metal behaviour.
- Develop the analytical model using a step-by-step refinement approach.
- Compare model predictions with experimental results.
- Refine the model based on discrepancies and insights from the data.
- Written report and oral presentation in the IKE-seminar for students.

Requirements:

- Strong interest in mathematical modelling.
- Basic understanding of two-phase flow physics is an advantage.
- Basic knowledge of MATLAB or Python is a plus.
- Good proficiency in English.

Start: from 01.08.2025 or later

Contact: MSc. Ruggero Meucci Pfaffenwaldring 31 • 70569 Stuttgart Ruggero.Meucci@ike.uni-stuttgart.de +49 (0) 711 685- 60786 Bachelor or Master Thesis

Development of a Simplified Analytical Model for High-Temperature Heat Pipes



Fig. 1: Example of an experimental setup for high temperature heat pipe performance measurement.



The University of Stuttgart would like to increase the proportion of women in the scientific field and is therefore particularly interested in applications from women. Severely disabled persons are given priority in the case of equal suitability.

