



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

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