Objective:
The task of the work includes the numerical and experimental determination of the temperature and velocity profile of an air flow in a chimney for the cooling of finned two-phase closed thermosiphons (TPCT).

Background:
As part of the research project "Analytical and experimental investigation of closed two-phase thermosiphons for passive heat removal from spent fuel pools", TPCTs with external finning (see Fig. 1) are investigated at IKE to increase the convective heat transfer due to the enlarged heat transfer surface. Therefore, the temperature and velocity profile of the convective air flow in the chimney shall be modelled and analysed numerically. Subsequently, the numerical results have to be validated by means of experimental data.

Procedure:
• Familiarization with the fundamentals of TPCTs,
• Co-work on the construction and measurement instrumentation of the chimney,
• Numerical modelling of the cooling process of the TPCT,
• Measurement campaigns to determine the temperature and velocity profile at selected TPCT’s operation temperatures,
• Comparison of numerical and experimental results,
• Evaluation and classification of the results,
• Written elaboration and oral presentation.

Requirements:
• Interest in numerical and experimental work,
• Basic knowledge in measurement techniques and/or in CFD software desirable,
• Very good German or English skills.

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Fig 1: Sketch of the test section for thermal investigations on convective heat transfer at a finned TPCT (a) and exemplary temperature profile in the chimney (b)