Universität Stuttgart
Institut für Kernenergetik
und Energiesysteme

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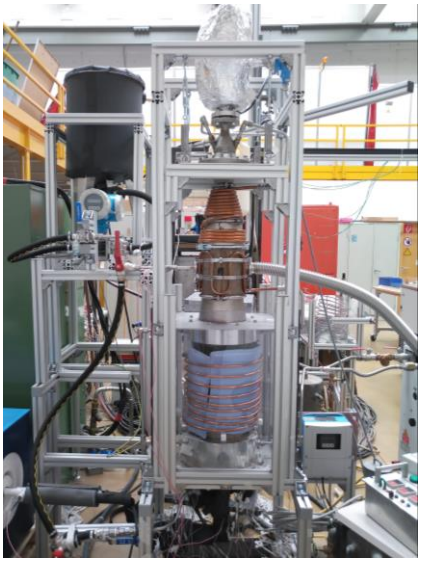
HiWi / Student Project / Master's Thesis

Development and construction of an optical capturing system for the quench front propagation in superheated particle beds

Aim:
The aim of the work is to develop and construct an optical capturing system to visualize the quench front propagation in dry superheated particle beds.
Therefore, the design and construction of an ideal camera mounting solution has to be developed and tested by conducting exemplary unheated experiments on the FLOAT test facility.
Furthermore, the obtained visual data is post-processed and analysed to define the optimal camera setup.

Background:
During severe reactor accidents involving loss of coolant, the reactor core may melt, forming a particle bed through interaction with residual water in the Reactor Pressure Vessel. For the rapid cooldown of particle beds multi-dimensional two-phase flows occur, understanding of which is crucial to predict the coolability of particle beds. In the context of reactor safety research, the investigation of the removal of decay heat from a debris bed is of crucial importance in order to be able to make predictions about the long-term coolability of particle beds and to prevent further accident progression. In this context, experiments are carried out at IKE which, serve to validate numerical models of the IKE simulation code COCOMO-3D.



FLOAT Test Facility

Procedure:
- Development of camera mounting system for optical capturing of quench front propagation
- Modification of the experimental setup
- Carrying out and analyzing exemplary experiments
- Post-processing of visual data and definition of optimal camera setup
- Analysis of experiments, written elaboration, presentation

Prerequisites:
- Manual skills and dexterity for precise construction and assembly
- Basic knowledge of measurement technology and data acquisition
- Familiarity with SolidWorks.

Start: Immediately

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