Karlsruhe Institute of Technology

Institute for Fusion and Reactor Technology
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Thermal-hydraulic analysis of the SCWR-FQT fuel bundle

Master Thesis / Diplomarbeit

Task description

Among the six Gen-IV reactors, supercritical water cooled reactors (SCWR) is the only one reactor using water as coolant. The European SCWR fuel qualification test (SCWR-FQT) project is devoted to the design and licensing of the experimental facility with a small scale fuel assembly.

Cladding temperature of the fuel rod is the key design criteria for the SCWR. A system/subchannel coupled code system will be utilized to perform the thermal-hydraulic analysis of the fuel bundle of SCWR-FQT. The effect of different parameters on the calculated fuel cladding temperature is investigated, such as heat transfer correlations and local blockage.

The main tasks of the thesis consist of:

- Adaptation of both the system analysis code ATHLET and the sub-channel analysis code MATRA for the SCWR-FQT test facility
- Calculation of system behavior under steady state and selected transient conditions with the system analysis code ATHLET
- Analysis of fuel cladding temperature with the sub-channel analysis code MATRA and boundary conditions provided in the task 2
- Assessment of the effect of heat transfer correlations and local blockage on the cladding temperature

Prerequisites

- Student of the mechanic engineering or chemical enginnering
- Basic knowledge of fluid mechanics and heat transfer

Start date

now

Duration

4-6 months (depending of the scope of work)

Person in charge and contact

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