Karlsruher Institut für Technologie

Institut für Neutronenphysik und Reaktortechnik
Leiter: Prof. Dr.-Ing. Robert Stieglitz

Internship/ Master Thesis/ Bachelor Thesis

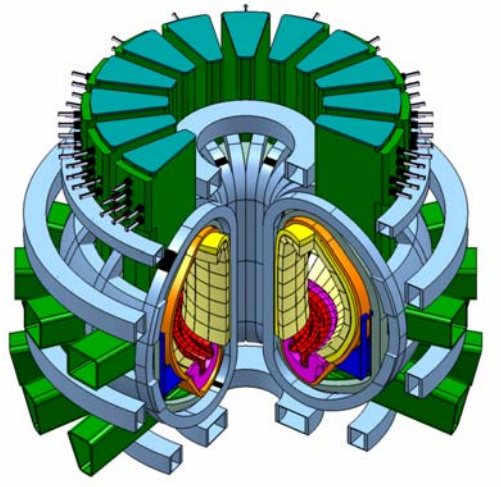
Subject: Physics, Mechanical Engineering, Mathematics, Engineering, Fluid Mechanics and other similar subjects

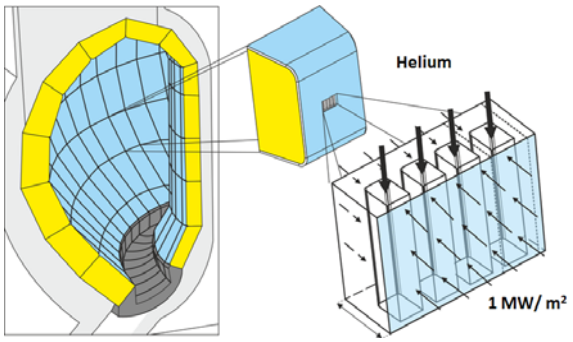
Topic: Numerical Simulations (Hybrid RANS/ LES Approaches) for the Heat Transfer of Ribbed Cooling Channels in the First Wall of Future Fusion Reactors (DEMO)

Workflow/ Objective:

Even in 2016, Germany's total primary energy consumption was covered only by 3.9 % from photovoltaic, hydro and wind power and but still more than 80% from fossil fuels. In light of this, the development of nuclear fusion reactors is a useful supplement to other solution strategies for the growing energy problem.

The first wall of future fusion reactors (DEMO) is subject to high thermal loads (up to 1 MW/m^2). With numerical flow simulation techniques accurate heat transfer for the cooling channels of the first wall can be calculated. The cooling channels are rectangular, one-sided ribbed and helium perfused channels. The aim is to keep the temperature in the wall material below 500 °C. Different rib configurations should to be investigated with regard to their effects on the heat transfer.





The work includes:

- Training in numerical fluid mechanics, turbulent flows, heat transfer
- Meshing with Ansys ICEM CFD running the simulations with Ansys Fluent
- Detailed evaluation of results (postprocessing) and interpretation of the results
- Written elaboration of the procedure and the results

When: now or later

Supervisor: Dr. Ch. Klein, Karlsruhe Institute of Technology, Campus Nord, Germany
Tel: +49-721-608-22251, email: Christine.Klein@kit.edu

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