Poster-216



Karlsruhe Institute of Technology

Institute for Neutron Physics and Reactor Technology (INR) P.O. Box 3640 D-76021 Karlsruhe, Germany www.kit.edu

meng.zhao@kit.edu



31st SYMPOSIUM ON FUSION TECHNOLOGY

CFD Simulation of Helium-cooled Divertor Test Mock-up

M. Zhao, B. Ghidersa

He-cooled divertor testing under HHF conditions

Helium Multi-Jet (HEMJ) Pipe concept was tested under high heat loads in HELOKA facility of KIT:

> 1000 pulses (300s long) @ 8MW/m² and 25 pulses @ 10MW/m²

Simulation domain, mesh and turbulent models



with Helium at 400°C and 8MPa.



Initial load screening showed an axially increasing surface temperature profile



ANSYS-2019R1

SST turbulent model

15.4 Million Mesh with y+ close to 1 at jet nozzle and impingement zone

Simulation of 600s cycling loading with ANSYS





800°C for an uniform heat load of 6MW/m².

When applying the load to only 13 slabs (left side) from the total of 23 slabs the pipe temperature reaches 800°C at 8MW/m².



Conclusions

The CFD Model was compared with experiment data of 4MW/m²

Simulation of 8 MW/m² heat flux predicts the maximum temperature of tungsten blocks and laminated tube

Time steps of highest temperature and maximum temperature difference during the heat up and down were selected for stress analysis



This work has been carried out within the framework of the EUROfusion Consortium and has received funding from the Euratom research and training programme 2014-2018 and 2019-2020 under ement No 633053. The views and opinions expressed nerein do not necessarily reflect those of the European Commission.

