Contribution ID: **691** Type: **not specified**

P2.119 Hydraulic analysis of EU-DEMO divertor plasma facing components cooling circuit under nominal operating scenarios

Tuesday, 18 September 2018 11:00 (2 hours)

Within the framework of the Work Package DIV 1 - "Divertor Cassette Design and Integration" of the EUROfusion action, a research campaign has been jointly carried out by University of Palermo and ENEA to investigate the steady state thermal-hydraulic behaviour of the DEMO divertor cassette cooling system, focussing the attention on its Plasma Facing Components (PFCs). The research campaign has been carried out following a theoretical-computational approach based on the Finite Volume Method and adopting the commercial Computational Fluid-Dynamic code ANSYS-CFX.
A realistic model of the PFCs cooling circuit has been analysed, specifically embedding each Plasma Facing Unit (PFU) cooling channel with the foreseen swirl tape turbulence promoter, hence resulting in a finite volume model much more detailed than those assessed in previous analyses. Its thermal-hydraulic performances have been numerically evaluated under nominal steady state conditions, also comparing the obtained results with the corresponding outcomes of analogous analyses carried out for a simplified PFCs configuration, without swirl tapes. Moreover, the main thermal-hydraulic parameters have been evaluated in order to check whether the considered PFCs cooling circuit might fulfil the total pressure drop requirement (⊠p < 1.4 MPa), providing a uniform cooling of the Vertical Target PFU channels with a viable CHF margin (> 1.4).
The PFCs cooling circuit thermal-hydraulic behaviour has been additionally assessed at alternative operative conditions, issued to check the viability of a coolant velocity reduction, in order to minimize corrosion and vibrations inside the PFU channels.
Models, loads and boundary conditions assumed for the analyses are herewith reported and critically discussed, together with the main obtained results.

Presenter: VALLONE, Eugenio (Department of Energy Information Engineering and Mathematical Models University of Palermo)

Session Classification: P2