Contribution ID: **411** Type: **not specified**

P4.075 Nuclear analysis of the collective thomson scattering system for iter

Thursday, 20 September 2018 11:00 (2 hours)

The Collective Thomson Scattering (CTS) will be the ITER diagnostic responsible for measuring the alpha-particle velocity distribution. Using mirrors, a 1 MW microwave beam is directed into the plasma via an opening in the plasma-facing wall. The microwaves will scatter off fluctuations in the plasma, and the scattered signal is recorded after transmission through a series of mirrors and waveguides. The system will be implemented in drawer #3 of the Equatorial port plug #12 facing the plasma, leading to several components of the CTS system to be directly exposed to neutron radiation from the plasma which can change the properties of the components and reduce their lifetime. In this work, a neutronics analysis is presented for the CTS system with neutron and gamma-ray spectra and heat loads for the main components of the system. Also presented is a study of the nuclear heat loads in the launcher mirror depending on its material composition, complemented with a finite-element thermal analysis performed with ANSYS Mechanical which shows how the nuclear heat loads translate into operation temperatures. Results for the updated system are presented, considering the new reference model with the adjacent diagnostic systems to the CTS drawer as well as the new shielding structure of the diagnostic. All the presented studies were conducted using the Monte Carlo program MCNP6.

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Session Classification: P4