neutron–PHYSICAL calculations of diagnostic equipment in the iter equatorial port

R.S. Afanasenko, A.G. Alekseev, and A.A. Borisov

National Research Centre Kurchatov Institute, Moscow, Russia, afanasenkorom@gmail.com

This work developed to the study of the location of first mirror unit (FMU) of “Hα and visible spectroscopy” (H alpha) diagnostic in the equatorial port №11 (EPP # 11) ITER on the total neutron flux near closure plate of port plug.

In the equatorial port reactor’s model C-Lite was posted diagnostic assembly with three identical diagnostic module (diagnostic shielding module - DSM), which function to protect it. They are installed with a gap of 5 mm between each other and with a gap of 2 cm to the wall of the port. The diagnostic modules are based on the Generic model of ITER equatorial port plug design. Side DSMs do not contain a diagnostics and are filled with an additional protective material (B4C), and in the central module major elements of the H-alpha: the optical path and mirrors.

Models of the various configurations in the presence of 2 cm gap between the wall of the port and housing wall diagnostic assembly which further contributes with high energy neutrons. The calculations were made in two versions - with an empty gap of 2 cm to the wall of the equatorial port and filled steel SS316L (N)-IG.

It is shown that the 350 mm displacement of the FMU deeper into the central module with respect to its nominal position leads to a slight change in the total neutron flux in the sealing plate and improve neutron’s characteristics of mirrors diagnosis of H-alpha.

Model of the central diagnostic shield module with channels of H-alpha has been supplemented by a collimator for neutral particles analyzer (NPA). Results of similar calculations with two diagnostics show that the displacement FMU has the same effect.