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Shutdown Dose Rate Calculation for the Preliminary Concept of K-DEMO Equatorial Port Area

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The Korean fusion demonstration reactor (K-DEMO) will be operated in a highly irradiated condition by 14 MeV neutrons from D-T plasma. During this condition, irradiated materials generate radioactive nuclides. The nuclides emit decay gammas during operation and even after the shutdown of the tokamak reactor. One of the important safety-related maintenance areas in the tokamak reactor is the outboard equatorial port area. Although it is close to highly irradiated plasma facing components, the human access is necessary for the maintenance. Thus, the reliable result for the shutdown dose rate calculation has to be presented to assure the human safety. The preliminary concept of K-DEMO equatorial port was developed and then, it was transported into the K-DEMO neutronic analysis model [1]. This model adopted the labyrinth structure to prevent neutron leakages between the equatorial port structure and neighboring components. The shutdown dose rate calculations have been performed in the vicinity of the equatorial port area based on the rigorous 2-step (R2S) method [2]. This method couples transport and activation codes of the MCNP [3] and FISPACT [4]. The shielding calculation by changing shield thickness has also been performed to provide adequate neutron and radiation shields to reduce the dose level at the equatorial port interspace. The preliminary analysis results indicate that the dose level in this area is below the design target value of 100 μSv/h at 12 days after shutdown.

References:
[1] J. S. Park, K. Im, and S. Kwon, "Development of the Advanced Neutronic Analysis Model for the K-DEMO with MCNP Code", IEEE Transactions on Plasma Science 44 (2016) 1751-1757.
[2] Y. Chen and U. Fischer, "Rigorous MCNP based shutdown dose rate calculations: computational scheme, verification calculations and application to ITER", Fusion Engineering and Design 63 (2002) 107-114.
[3] D. Pelowitz, (Ed.), MCNP6TM User's Manual, Version 1.0, Los Alamos National Laboratory LA-CP-13-00634, Rev. 0, May 2013.
[4] R. A. Forrest, FISPACT-2007 User manual EURATOM/UKAEA fusion association (2007)

Eligible for student paper award?

No

Authors: PARK, Jongsung (National Fusion Research Institute); Dr IM, Kihak (National Fusion Research Institure, Republic of Korea); Dr KWON, Sungjin (NFRI)

Presenter: PARK, Jongsung (National Fusion Research Institute)

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