ICFRM2007/367
Estimation of Shutdown Dose Rates for maintenance of the DFLL-TBM for ITER

S. Zheng, M. Chen, Y. Meng, Q. Zeng and Y. Wu
Institute of Plasma Physics, Chinese Academy of Sciences, P.O. Box 1126, 230031 Hefei, Anhui, China
slzheng@ipp.ac.cn

The Dual-Functional Lithium Lead - Test Blanket Module (DFLL-TBM) system, which is designated to demonstrate the integrated technologies of both He single coolant (SLL) blanket and He-LiPb dual coolant (DLL) blanket, is proposed for test in ITER to check and validate the feasibility of the China LiPb blankets designs and concepts. The DFLL-TBM will be installed in the equatorial position of the Outboard Blanket region in ITER device, which is located at the position with the highest neutron fluence during the D-T operation. The entire operation phase will last about twenty years and will involve a few thousand hours of D-T operation with the tritium supplied from external sources. As a result, the materials of DFLL-TBM will be irradiated in a high energy neutron activation environment during D-T operation so that thousands of radioactive isotopes will be produced, especially for the structural material, i.e. CLAM steel, one of the Reduced Activation Ferritic/Martensitic (RAFM) steels under wide research in the world.

The shutdown dose rate is calculated by 1-step Monte Carlo (1S/MC) method, which requires modification of nuclear data library replacing prompt gamma spectrum with decay gamma spectrum, called as 1S/MC data, and also modest change of the computer program MCNP. In this contribution, based on the latest IAEA nuclear data library FENDL2.1, the modified nuclear data library, which used in the evaluation of shutdown dose rate, is updated to expanded from the original 15 isotopes to 81 isotopes and considered more activation reactions and branches so as to evaluate the shutdown dose rate accurately, especially for the materials with complicated compositions. Therefore, the comparison and analyses on the contributions of those isotopes involved in DFLL-TBM to the shutdown dose rate, which are evaluated by the updated 1S/MC data library and modified MCNP/4C, have been performed to evaluate the activation characteristics of the materials in DFLL-TBM and then to optimize the material design and/or selection etc. in order to insure the dose rate level of the personnel access for maintenance less than the limitation at different time after reactor shutdown.

Number of words in abstract: 339
Keywords:
Technical area: 81. Materials challenges in ITER/ITER-TBM
Special session: Not specified
Presentation: No preference
Special equipment: No special equipment