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P3.192 Comparative study of the neutronic performances of EU-WCLL and China-WCCB breeding blanket concepts

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On the end of 2017, in the framework of EUROfusion R&D activities, a close collaboration between EU and China has started aiming at elaborating joint strategies for the development of the Water Cooled Lithium Lead (WCLL) and the Water Cooled Ceramic Breeder (WCCB) Breeding Blanket (BB) concepts. In this framework, an intense research campaign has been carried out at the University of Palermo, in close cooperation with ENEA Brasimone and ENEA Frascati, in order to compare the neutronics performances of the WCLL and WCCB BBs under irradiation in EU-DEMO.
To this end, three-dimensional nuclear analyses have been performed with MCNP5 v. 1.6 Monte Carlo code. A semi-heterogeneous MCNP model of the WCLL BB in a "single module segment" lay-out has been used and an analogous semi-heterogeneous MCNP model of the WCCB BB has been set up and adapted to the reference EU-DEMO model. The nuclear responses of both the BB concepts have been assessed focussing the attention mainly on global quantities as nuclear power deposition and Tritium Breeding Ratio as well as on the shielding performances. The obtained results provided significant information on the different nuclear features of the two concepts, useful for the optimisation of both WCLL and WCCB BBs design. The outcomes of this comparative study are herein presented and critically discussed.

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