[10/09/2014 - P047]

COMPUTATIONAL CALCULATION OF THE NEUTRON FLUXES AT THE GCFTR-2 FUSION-FISSION HYBRID REACTOR,

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Faced with the prospect of a global increase in energy consumption, decreasing supplies of fossil fuels and the global warming, nuclear energy has several strong points in its favor. In this context, new technologies studies are extremely needed. It is known that several international projects are in course for the same purpose, such as ITER, a large-scale scientific experiment that aims to demonstrate that it is possible to produce commercial energy from fusion. In order to reach the goal of a feasible new technology, there are several different approaches that could be employed, including fission reactors, accelerators and fusion systems, or even hybrid systems. An interesting point is that all of them generate high-energy neutrons. Mainly based on the neutron excess of Fusion systems, it is considered that the Fusion-Fission Hybrid concept is the most advantageous: the easiest fusion reaction to achieve D-T fusion produces a 14MeV neutron that can be used to drive much more energetic fission reactions using a fissile blanket. A discussion about fuels that could be utilized to generate energy and its associated cross sections is also held. This work presents the calculated total and high-energy neutron fluxes at the fission core of the Gas Cooled Fast Transmutation Reactor (GCFTR-2). The results were achieved by simulations with the MCNP-5 nuclear reactor physics code, and the ENDF/B-VII.1 Neutron Data library.