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ASSESSMENT OF THE EFFECT OF BURNOUT IN THE PULSE RESEARCH NEPTUNIUM REACTOR

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After modernization in 2011, the IBR-2 pulsed reactor at the Joint Institute for Nuclear Research has been successfully used by researchers from dozens of countries to carry out experiments on extracted neutron beams in solid-state physics. However, the capability of reactor operation is limited by the life-time from 2032 to 2035.Iin order to maintenance this area of research, it is necessary to create a new world-level neutron source by the mid-2030s. The pulsed neutron source, which is currently developed by the Joint Institute for Nuclear Research (JINR) is a research reactor of periodic action with nuclear 237NP nitride fuel.
One of the characteristics which determines the capability of the reactor operation is changing reactivity effect during the life-time. The change of reactivity is summarized from the negative effect of neutron absorption by the neptunium nucleus and the positive effect of plutonium-238 accumulation as a result of neutron capture by the neptunium nucleus. It is expected that the total reactivity effect in a neptunium reactor will be little or even positive, and its assessment depends on the library of neutron data used to calculate the critical state. The current paper describes assessment of the comparative effect for several of the most used databases (ENDF / B-VII.1, JEFF –3.2, JENDL –4.0, ROSFOND –2010, TENDL –2017, BROND –3.1) with energy spectrum of the neutron flux density in the Neptune reactor core, which was calculated using the MCNP5 package.

Poster back-up

Yes

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