FEATURES OF THE FORMATION OF RADIATION IN A NEW-GENERATION OF FUEL WITH A COMPLEX INTERNAL HETEROGENEOUS STRUCTURE

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Fuel and structural materials of existing reactor systems (reactors) and innovative reactor plants operate in extreme conditions. These extreme conditions include higher operating temperatures, increased (extreme) burn up, exposure to aggressive media, etc. For the long-term trouble-free and efficient operation of the reactor , the fuel must have good thermal conductivity, radiation and thermal stability. To increase thermal conductivity, radiation and thermal stability, the fuel is modified by adding various homogeneous compounds [1] and heterogeneous inclusions [1,2]. However, these additives affect the neutron component of the radiation characteristics of irradiated fuel [2]. So far, little research has been done in scientific journals on the effects of various additives on the neutron background of fresh fuels and irradiated fuels, or even on fuels containing heterogeneous inclusions. The meaning of the work is that the fuel is modified to improve its thermal conductivity, thermal and radiation resistance, while they do not consider the fact that such fuel requires special handling after its operation. In the work authors, the applicant will use MCNPX for numerical experiments couple with other software (Sources-Serpent), to study the characteristics and mechanisms of the formation of residual neutron radiation on fuels in a LWR reactor with a complex heterogeneous internal structure. The scientific problem studied in this work is aimed at developing procedures for handling new-generation irradiated fuel during transportation and “dry” long-term storage (See Fig. 1, [3]).

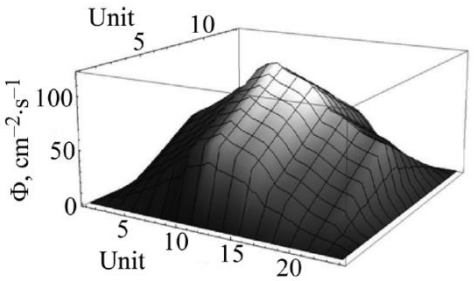

Fig. 1. Results of calculations Φ(E,r) of «dry» storage systems with modified fuel

In addition, since additives affect the components of the fuel, the reprocessing of spent nuclear fuel needs to be changed accordingly. But compare with the traditional open fuel cycle with direct disposal, the reprocessing-recycle cost is more expensive. How to improve the reprocessing of fuel, reduce the disposal amount of high-level radioactive waste and reduce its costs are also considered and studied.

REFERENCES

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