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#05-197 Position evaluation of ex-core neutron flux measurement in new type graphite reactors

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Several concepts of new reactors use graphite. Some of them use graphite as a moderator, some of them as a reflector. There are at least two concepts of these graphite-type reactors under development in Czech Republic –the Energy Well and the Teplator. Both reactors use graphite as the reflector. An in-core measurement might be impossible to use due to various reasons, for instance high temperature or aggressive environment. Therefore, this article focuses on ex-core neutron flux measurement system placed in the graphite reflector and the optimization of ex-core detector position. A set of experiments were performed at LR-0 reactor. The LR-0 is a light water reactor with well-defined neutron field, which can be used for different material insertion testing and testing of its influence on criticality. The three modifications of LR-0 cores were modelled in Monte Carlo codes Serpent and KENO. A set of calculations were performed for verification of the criticality and neutron flux course in reactor core and graphite reflector. Further investigation was focused on the influence of graphite reflector presence on neutron distribution in the reactor core. The LR-0 graphite experiments were also used for models' calculations verification. Based on the results of this article, the optimal position of ex-core detectors in the mentioned new reactor types were proposed.

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