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#7-288 Accurate Simulation of Neutron Fields using Tramo

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Efficient nuclear dismantling requires a separation of activated materials from nonradioactive materials. To determine which regions of a nuclear reactor are activated, the spectral fluence of neutrons has to be known. It can be measured using activation probes while the reactor is still operational, but after it has been shut down, the neutron fluence has to be simulated using a Monte Carlo simulation. Simulations need to be verified in known setups to produce accurate results. The irradiation facility at the TU Dresden can be used for this purpose. The irradiation facility is composed of multiple alpha-N sources and a large moderating volume. It allows for the irradiation of samples in a neutron field. The alpha-N sources produce fast neutrons with an energy of up to 12 MeV. The moderating volume consists of approximately 50 cm of PET, where the outer layer also contains boron for shielding. Activation samples of materials can be placed inside the irradiation facility close to the alpha-N sources. There the sample is activated by fast neutrons coming directly from the source as well as intermediary and thermalized neutrons scattered from the moderating volume. In addition to neutrons, the alpha-N sources also produce photons of various energies. For the simulation, the Monte-Carlo code Tramo developed at HZDR is used. Tramo is designed to simulate the spectral fluence of neutrons in nuclear reactors. Tramo simulates the transport of both neutrons and photons in a defined geometry. In order to use Tramo for the simulation of the irradiation facility, parts of the code have to be adapted. Tramo will be used to simulate the spectral fluence of neutrons at the irradiation facility. By utilizing measurements done at the facility, the accuracy of the simulation can be verified. Additional simulations using Geant4, Serpent and MCNP of the same facility will be done for comparison.

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