

عنوان مقاله:

Computational study of the effect of sapphire neutron filter on reducing the neutron and secondary-gamma dose rate around the main shield of D channel in TRR

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خلاصه مقاله:

Simulation work provides valuable information on the behavior of different research reactor neutron analysis facilities. The present study considered neutron and secondary-gamma dose rate variations by applying a sapphire crystal inside the D channel in Tehran Research Reactor (TRR). The MCNPX computational code was used to model the channel and its designed shield. Neutron and gamma dose rates distributions were calculated with a sapphire crystal modeling to investigate the neutron diffraction facility hall dose rates. The data from the dose rate simulations were compared with the experimental data available at a power of ۴.۲ MW from the research reactor. The comparison showed that there is very good conformity between two data series. The simulated neutron dose rate in front of the main shield overestimated the measurement data by ۵۷% in closed-shutter situation and underestimated the measured data by ۳۲% in open-shutter measurement situation. The investigation has shown that adjusting the crystal size to the channel size is considerably effective, especially at high leakage positions.

کلمات کلیدی:

Neutron filter, Neutron and gamma dose rate, Sapphire crystal, Tehran Research Reactor, MCNPX simulation, Benchmark study

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