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The MCNP Simulation of Prompt Gamma-Ray Neutron Activation Analysis at TRR-1/M1

Authors : S. Sangaroon, W. Ratanatongchai, S. Khaweerat, R. Picha, J. Channuie

Abstract : The prompt gamma-ray neutron activation analysis system (PGNAA) has been constructed and installed at a 6 inch diameter neutron beam port of the Thai Research Reactor-1/ Modification 1 (TRR-1/M1) since 1989. It was designed for the reactor operating power at 1.2 MW. The purpose of the system is for an elemental and isotopic analytical. In 2016, the PGNAA facility will be developed to reduce the leakage and background of neutrons and gamma radiation at the sample and detector position. In this work, the designed condition of these facilities is carried out based on the Monte Carlo method using MCNP5 computer code. The conditions with different modification materials, thicknesses and structure of the PGNAA facility, including gamma collimator and radiation shields of the detector, are simulated, and then the optimal structure parameters with a significantly improved performance of the facility are obtained.

Keywords : MCNP simulation, PGNAA, Thai research reactor (TRR-1/M1), radiation shielding
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