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# Collimator design for neutron radiography station using Monte Carlo simulation

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In this research, neutrons and gamma rays at the neutron radiography station of Thai Research Reactor, TRR-1/M1, at Thailand Institute of Nuclear Technology (Public Organization) were characterized. The aim was to design an appropriate outer neutron collimator at the neutron radiography station for collimating neutron beam to the radiographic position, by reducing radiation scattering and reducing dose rate around the radiography station. Beam characteristics of 3 different designs of collimators were studied at the reactor power of 1.2 MWth by using Monte Carlo simulation. From the results, the outer collimator assembled from 5.5 cm-thick of borated polyethylene (5% boron) which was covered by 1 cm thick lead and 0.5 cm-thick iron, respectively, and the length of 50 cm could reduce the gamma ray scattering most effectively. Moreover, the neutron fluence at the radiographic position of 100 cm and 140 cm were increased by 22% and 8%, respectively, when compared with the condition without an outer collimator. Therefore, the exposure time and also the dose rate around the radiographic station could be reduced. In the future, the outer collimator will be constructed and will be installed based on this appropriate design.
Keywords: Neutron radiography, Collimator, Borated polyethylene, Radiation scattering, TRR-1/M1

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