

عنوان مقاله:

The Comparison of Neutron Beams through $\gamma\text{Li}(p,n)$ Reactions for the Design of a Thermal Neutron Radiography Facility using the MCNPX Code

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خلاصه مقاله:

In this work, a comparison of six neutron beams was carried out using the MCNPX Monte Carlo code for thermal neutron radiography purposes. The necessary neutrons produced via the $\gamma\text{Li}(p,n)$ reaction for 1 mA proton beam with energies 2.3, 2.5, 3, 4, 4.5, and 5 MeV. The design of the facility was governed from the purpose to achieve the maximum thermal neutron flux in the position of the investigated object. An extensive number of simulations were realized for every source under different conditions. The higher energy of proton beam provides higher intensity for the neutron source but at the same time, the produced spectrum shifted to the fast neutron area. Protons with energies from 2.3 to 3 MeV are more suitable when the thermal neutron content is the main issue of the facility design. Neutrons produced by proton beam in the energy range of 4-5 MeV provide higher thermal neutron fluxes at the cost of the thermal neutron content. The final choice is a compromise, between the thermal neutron content that can be tolerated, in combination with a workable thermal neutron flux.

کلمات کلیدی:

$\gamma\text{Li}(p,n)$ Reaction, MCNPX Monte Carlo Code, Non Destructive Testing, Thermal Neutron Radiography

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