Calculating gamma ray exposure buildup factors for plane source and double stratified layers of water and lead and investigating effect of coherent scattering on these factors

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Abstract

In this work, gamma exposure buildup factors (E.B.F.) for plane sources and two-layer shields of water and lead were calculated. Also, coherent scattering effect usually left unattended in this type of geometry and application was considered. First, gamma EBFs were calculated by using MCNP, without considering coherent scattering effect for a normal and anisotropic plane source and double stratified layers of water-lead and lead-water. Then, the above-mentioned factors were calculated by considering coherent scattering effect, and influence of coherent scattering and also fluorescence radiations on E.B.F. was studied. Due to coherent scattering, EBFs were increased in both layers, especially for sources with low energies and layers with more mean free paths. Regarding the high accuracy of statistical calculation and the applied cross sections, more complete results in comparison with previous works for the mentioned geometry were obtained.

Keywords: MCNP, Monte Carlo, gamma ray buildup factor, coherent scattering, fluorescence radiation

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