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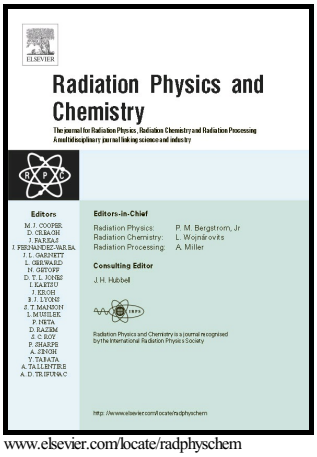

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A new approach to examine the exposure and dose buildup factors for multi-energy radioisotopic gamma sources with G-P analytical expression

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Abstract

The gamma ray exposure and dose buildup factor for five point isotropic multi-energy sources have been studied up to a depth of 10 mean free paths (mfp) for aluminum, concrete, iron, tin, lead, tungsten and uranium using the Monte Carlo code MCNPX. All secondary particles produced inside the shields were taken into account in the calculations. These findings are adequate for shielding of photon and dosimetry calculations. The obtained values of dose buildup factor were parameterized as a function of mfp based on geometric progression (G-P) analytical expression, and the parameters were obtained for different gamma sources.

Keywords: Exposure buildup factor; Dose buildup factor; γ-ray source; MCNPX; G-P fitting

1. Introduction

Knowing the flux of photons is important in radiation shielding for radiation protection, transportation and storage of radioactive materials, industrial applications and other cases where photon sources are used (IAEA, 1975; Tompkins, 1960; Vega-Carrillo et al., 2018).