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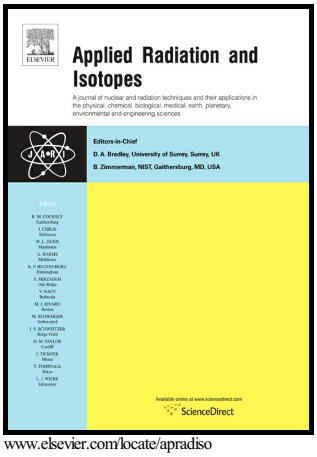

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Dose calculation using Haar wavelets with buildup correction

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Abstract

In this work, we focus on the buildup correction of dose calculation using Haar wavelets in the Tunisian gamma irradiation facility. The buildup effect of gamma rays was used to adjust absorbed dose calculation for different depth in the irradiated products. A buildup study with different product densities was carried out to generalize the dose adjustment approach to any product at any depth.

Keywords: Buildup factor; Dose calculation; Haar wavelets.

1. Introduction

Haar wavelet method is presented as an alternative to conventional methods of the absorbed dose determination such as direct measurements and Monte Carlo simulation [1]. The benefits of the Haar wavelet method lies in its ability to provide sufficiently accurate results with a reduced computing time [2].

In the case of irradiated product, the unpredictable behavior of scattered gamma rays requires the adjustment of the calculated dose. In this work, we propose a dose correction method using the buildup factor.

Products with different densities were taken into account to study the buildup factor using the simulation of the total absorbed dose and that induced by only unscattered photons. Moreover the variation of the buildup versus product density was carried out. It leads to the generalization of the buildup correction method of the absorbed dose calculation only with the knowledge of the product density.

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