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DEVELOPMENT OF AN ANALYTICAL MODEL FOR THE DEPTH DOSE PROFILE PRODUCED BY GAMMA RADIATION

Monte Carlo codes are among the most used tools today for calculations and simulations related to medical physics [1] and particularly for studies of low dose medical applications.
In this work, we have undertaken on the development of an analytical model with the aim of calculating the deposit dose produced by ionizing radiation inside a medical phantom (filled with light water). The CNSTN cobalt 60 source irradiator was used as the experimental validation platform for this study. A Monte-Carlo modeling of the irradiator was thus performed by the Geant4 toolkit [2], with validations of some dose deposition results obtained by referring to previous experimental work. The model was then adapted to our case of study, by developing a more specific configuration, suitable for gamma radiation beam and variable energy beams.
The study of the theoretical behavior of the doses produced by these photons [3] in a phantom filled with water was also carried out. The numerical results obtained demonstrate different behaviors according to the different energies. Digital fitting was then made by the Matlab tool for these different behaviors. The compilation of all these results led to the development of an analytical model for the prediction of the behavior of the deposited doses in the case of the studied phantom.
Further studies of these same works, with 2D analytical modeling and the generalization of the study for the cases of other types of radiations, will be established later.

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