DXRaySMCS: A user-friendly interface developed for prediction of diagnostic radiology X-ray spectra produced by Monte Carlo (MCNP-٤C) simulation

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Abstract

In this work, the general purpose Monte Carlo N-particle radiation transport computer code (MCNP-٤C) was used for the simulation of X-ray spectra in diagnostic radiology. The electron's path in the target was followed until its energy was reduced to ١٠ keV. A user-friendly interface named 'diagnostic X-ray spectra by Monte Carlo simulation (DXRaySMCS)' was developed to facilitate the application of MCNP-٤C code for diagnostic radiology spectrum prediction. The program provides a user-friendly interface for: (i) modifying the MCNP input file, (ii) launching the MCNP program to simulate electron and photon transport and (iii) processing the MCNP output file to yield a summary of the results (relative photon number per energy bin). In this article, the development and characteristics of DXRaySMCS are outlined. As part of the validation process, output spectra for ٤٦ diagnostic radiology system settings produced by DXRaySMCS were compared with the corresponding IPEM٧٨. Generally, there is a good agreement between the two sets of spectra. No statistically significant differences have been observed between IPEM٧٨ reported spectra and the simulated spectra generated in this study. © The Author ٢٠٠٩. Published by Oxford University Press. All rights reserved.

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