dosimetry

Realization of the program interface for displaying the results dosimetry calculations of the VITA dosimetry planning system for boron neutron capture therapy.

A. Kuznetsov[1,2], E. Berendeev[2], G. Gorlachev[3], A. Koshkarev[1,2], T. Sycheva[2] and S. Taskaev[1,2]

[1] Novosibirsk State University, Novosibirsk, Russia
[2] Budker Institute of Nuclear Physics, Novosibirsk, Russia
[3]SIBMER Ltd., Novosibirsk, Russia
E-mail: kuznetsov1398@gmail.com

Boron neutron capture therapy (BNCT) is currently regarded as one of the most promising methods of cancer treatment - it allows for the targeted destruction of cells of some malignant tumors by accumulation of stable isotope ^{10}B in tumor cells and subsequent irradiation of these cells with a stream of epithermal neutrons.

An original accelerator source of neutrons VITA[1] was proposed and developed at the Budker Institute of Nuclear Physics for the Blokhin National Medical Research Center of Oncology. In 2025 it is planned to put it into operation in Moscow and use it to treat patients. A VITA dosimetry planning system (VITA DPS) should be developed for therapy planning and treatment outcome assessment. Calculation of four dose components considered in VITA is supposed to be performed by Monte Carlo method using the neutron and γ-radiation transport code NMC.

This paper presents the results of implementation of the software interface for modeling the voxel model of the modified Snyder head phantom. Dosimetry calculations were performed using the NMC code and comparison of the obtained results with reference values obtained using the MCNP code [2] is presented. A program interface for displaying the obtained results in the form of a "dose-volume" histogram was implemented, and the possibility of layer-by-layer display of the obtained doses on the voxel model in the form of a heat map was realized.

Acknowledgments:
This research was funded by Russian Science Foundation, grant number 19-72-30005

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