

The status and development of the hybrid Monte-carlo-deterministic particle-transport code NECP-MCX

Qingming He^{*}, Qi Zheng, Liangzhi Cao, Hongchun Wu

*School of Nuclear Science and Technology,
Xi'an Jiaotong University,
Xi'an, China*

qingming_he@xjtu.edu.cn, zhengqi@xjtu.edu.cn, caolz@xjtu.edu.cn,
hongchun@xjtu.edu.cn

NECP-MCX is a hybrid Monte-Carlo-Deterministic particle-transport code under active development by the Nuclear Engineering Computational Physics Lab. of Xi'an Jiaotong University. The most significant features and recent development of NECP-MCX are summarized in this paper. Firstly, the hybrid Monte-Carlo-Deterministic is employed to solve the deep-penetration radiation shielding problem. Secondly, the unstructured-mesh geometry functionality is developed. The unstructured-mesh geometry can be generated by multiple CAD softwares, which promotes the ability of modeling complex geometries. Thirdly, the functionality of structured voxel geometry and other functionalities needed for a dose solve of boron neutron capture therapy (BNCT) is developed. Other features like depletion and activation calculation, shutdown dose rate calculation, neutron noise analysis, sensitivity and uncertainty analysis, neutron-photon-electron coupling transport calculation, etc. are also developed.

Keywords: Monte Carlo, unstructured mesh, BNCT, neutron noise, sensitivity and uncertainty

* Corresponding author. E-mail address: qingming_he@mail.xjtu.edu.cn