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Research on Monte Carlo model of radiation source in HLS storage ring

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Hefei Light Source (HLS) is the first dedicated synchrotron radiation facility in China. HLS-II operates in the TOP-OFF constant-current mode. For the safety of personnel, it is crucial to analyze the radiation fields applying Monte Carlo. The radiation source directly affects the results. The paper discusses the impact of three radiation source models on the radiation field results. In the first model, beam averaged losses over eight bend magnets. The second model assuming that there is a uniform loss at all beam pipes and bend magnets. The third model assumes that beam losses uniformly in a torus pipe. The radiation field during TOP-OFF constant-current of HLS-II storage ring was simulated applying FLUKA. The position and direction sampling equations were constructed for different radiation sources. Simulation results indicated that the dose rates of the second model was consistent to the torus uniform loss model. The calculation results of two models are in accord with the actual situation. As for the simulations on the radiation fields and radiation shield design in the storage ring, the torus radiation source with uniform loss is more convenient to operate.

Footnotes

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