Considering the photofission reaction in modeling of the chain reaction of ^{235}U fission in the uranium cube by the TPT3 program

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The TPT3 program is developed in Dukhov Automatic Research Institute for the high-performance parallel simulation of the particle transport on the multicore CPU and GPGPU architectures with the SIMD instructions. One of the key features of the TPT program is the voxel geometry, which simplifies the massively parallel computations. The TPT3 program can propagate neutrons, gammas and atomic ions in matter. All propagated particles can have big weights. Each fission reaction provides one secondary neutron and one secondary gamma with weights, which are equal to the projectile weight multiplied by the differential multiplicities of the fission reaction. Thus the number of the propagated particles does not increase, while the weights of the propagated particles can be very big. The weighted particles help to simulate the nuclear chain reactions with the individual concentrations of elements in each voxel. As the weights of the propagated neutrons can be extremely high, the TPT3 program can simulate the nuclear fuel burnup and the dynamic modification of the voxel element concentrations including the fission fragments. Taking into account the radiation capture reactions, the TPT program can generate heavy isotopes of uranium in the voxel media. The influence of the photofission reaction on the simulated results of the fuel burnup is diskussed.