AbstractID: 1253 Title: DOSSCORE: An accelerated DOSXYZnrc code with an efficient stepping algorithm and scoring grid

Two different DOSXYZnrc-based algorithms, DOSNE and DOSFA, were implemented and tested. DOSNE has the same functionality as DOSXYZnrc, but is able to define a separate scoring grid superimposed on the geometrical grid. Therefore a different stepping algorithm has to be utilized that allows particles to take big steps in homogeneous regions where there is no interest in the dose deposition of these particles. In DOSFA, the geometrical grid also serves as a scoring grid, as in DOSXYZnrc, but DOSFA has the ability to define '*regions of interest*' that consist of rectangular regions, grouping voxels where dose is required and geometrical voxels containing a non-default material. Due to these regions of interest less voxels need to be taken into account during a simulation compared to DOSXYZnrc, which allows the particles to take bigger steps in other regions. Two cases were studied in which only lateral profiles and depth dose curves were required. The calculation times for a homogeneous water phantom illustrate that DOSNE and DOSFA are 2.01 and 1.85 times faster than DOSXYZnrc. For a heterogeneous phantom, DOSNE and DOSFA are 1.67 and 1.39 times faster than DOSXYZnrc. A perfect agreement is obtained between the results produced by DOSNE and DOSFA compared to DOSXYZnrc. Because DOSNE is more efficient than DOSFA in all situations studied, an accelerated version of DOSXYZnrc called DOSSCORE was implemented with DOSNE. A speed increase without introducing accuracy degrading variance techniques is very relevant. The principle can easily be applied to other Monte Carlo applications.