AbstractID: 7772 Title: Angular Correction in Reconstruction of Electron Spectra from Medical Accelerators

Monte Carlo treatment planning for electron beams requires an input of the energy spectrum for each beam. One convenient method to obtain this input is to reconstruct the energy spectrum for each beam from a measured depth-dose distribution. Reconstruction methods that use a database of normally incident monodirectional and monenergetic depth-dose kernels overestimate the low-energy component of the incident electron spectrum. This overestimation is due to the kernels used being of normal incidence to the surface. Electrons incident non-normally deposit more dose at shallow depths. The reconstruction algorithm interprets this increased dose deposition at shallow depths as additional low energy electrons of normal incidence in the spectrum. To improve reconstruction predictions in the low-energy region of the spectrum we use kernels of monoenergetic depth-dose curves corrected for the incident electron angular distribution. We generated monoenergetic depth-dose curves for different angles of incidence using 106 discrete energies between 0.5 and 27 MeV. Each of the discrete energies adopted were provided with 16 angular intervals between 0 and 90°. The resulting energy-angular response functions were then folded with an incident angular distribution estimated from Monte Carlo simulations. Reconstructed electron spectra based on the corrected response functions are in excellent agreement with the incident spectra in the low-energy region.