

This work examines equivalent field relationships using Monte Carlo generated energy deposition kernels. This approach overcomes several difficulties associated with measured dose quantities, including the impossibility of separately measuring primary and scatter dose, the lack of lateral electronic equilibrium at small field sizes, conversion of measured square field data to theoretical circular field data, and extrapolation of measured dose to zero-field size.

By implementing reciprocity and collapsing the intersection of the 3D energy deposition kernel and the incident fluence distribution onto the depth dimension, we obtain a 1D kernel representation for a single calculation point in the transverse plane. This provides an effective means of comparing energy deposition kernels at two different calculation points. In the convolution method, the final scatter estimate is affected by the shape of the kernel and by the total energy deposited by the kernel. If two kernel shapes are similar, then differences in the resulting scatter estimate will be due primarily to differences in total energy deposited. This feature has allowed us to develop equivalent field relationships based on integrated kernels, which we compare to those given in BJR 25. Furthermore, by comparing 1D kernel shapes of various fields, it is possible to observe situations where equivalent fields assumptions are no longer valid.