

Dose Calculations of a 6MV photon beam using a Finite-Size Pencil Beam Model

This work investigates the Finite-Size Pencil Beam (FSPB) model for calculating dose deposition from photon beams generated by a clinical linear accelerator. The FSPB model(1), uses the superposition of preconvolved "finite-size pencil beams" of small cross-sectional area to determine the dose deposition in a uniform phantom. In the dose computation, FSPBs for a range of energy bins are pieced together like mosaic tiles to collectively form the cross-section of the full beam. Depending on the full beam resolution, the superposition calculation can be much faster than full convolution. Results are presented for a 6MV photon beam. Comparisons of calculated and measured TMRs and output factors of open fields show excellent agreement between calculated and experimental values. Results include discussions of FSPB generation, the effect of beam softening across the field cross-section, and the method for modelling this effect using different FSPB weighting factors as a function of energy and location.

1. Bourland and Chaney, *Med Phys*, 19(6), 1992, pp.1401-1412.