

X-ray spectra weighted dosimetric quantities as a function of depth and 2-D position in a 4 MV X-ray therapy field.

X-ray spectra were derived from narrow beam transmission measurements in Al and water using a Cerrobend collimator between the attenuator and detector for 4 MV x-rays. A variation method was used to derive the x-ray spectra. The spectra were derived at 5 cm intervals in a 20x20 cm therapy field, resulting in 25 spectra. The spectra were derived in units of relative exposure per energy interval. The derived spectra were used to obtain weighted photon energies and weighted dosimetric quantities such as linear and mass attenuation coefficients and stopping power ratios based on position for the entrance spectrum at a 2-D point and along a depth at that 2-D position. The method easily demonstrates the relative hardness of the therapy beam at any point. The maximum variation in the dosimetric quantity at the surface was approximately 6% across the field. As the beam penetrated the phantom, the maximum variation in the dosimetric quantity at 20 cm depth compared to the surface was approximately 10%.