AbstractID: 1110 Title: In Vivo Diode Correction for Small Cutout Electron Fields

Electron diodes are usually calibrated to the dose at depth of normalization (d_{norm}) under standard reference conditions (100 cm SSD, 10×10 cone). In the case of small cutout sizes (d_{norm} shifts to shallower depth), diode readings are often observed to be higher than the dose at d_{norm}. In this work, we present an empirical method to correct the heightened diode readings.

For small cutout fields (smaller than 5.0×5.0), the lack of lateral equilibrium will cause significant output reduction. The number of MU has to be increased by a factor equal to the reciprocal of the Cutout Output Factor (COF, defined as the ratio of the dose rate at shifted d_{norm} for a custom cutout to that for the reference insert at its own d_{norm} with the same applicator) to compensate for the lack of equilibrium in order to deliver the prescribed dose. For electron diodes, we have observed that their response is independent of cutout sizes as if the lack of lateral equilibrium is compensated. If we assume equilibrium condition exists for diodes, then after the planned MU is delivered, the diodes reading will be higher than the dose at d_{norm} by a factor of 1/COF.

The aforementioned phenomenon is verified by measuring COF and diode readings of different cutout sizes in 10×10 cone for 6, 9 and 20 MeV electron beams from Varian 2100C Linac. The expected diode reading is calculated by: Diode Reading = Prescribed Dose/(COF×PDD/100). The measurement shows agreement within +/- 3.0% with the expected diode reading.