

AbstractID: 12839 Title: Dosimetric properties of a transmission detector in a 6 MV photon beam

Introduction: The objective of this study was to investigate dosimetric properties of a new transmission dosimeter system. The system, COMPASS (IBA Dosimetry, Germany), contains 1600 plane parallel ionization chambers with a detector spacing of 6.5 mm and an active volume of 0.02 cm³. The COMPASS detector is mounted on the gantry of the linear accelerator to perform on-line dose verification during treatment. We checked capability of the system for dose verification in clinical intensity modulated radiotherapy (IMRT) plans. **Methods and Materials:** First, the COMPASS system was modeled by dosimetric data (percent depth dose, off-axis ratio, and output factor) for a 6 MV photon beam. The dosimetric properties for simple square fields and various MLC test patterns were checked by comparison with those of MapCHECK and EDR2 films. The Monte Carlo simulations were also used as needed. The system was also compared for dose verification in clinical IMRT plans of neck cases. **Results and Discussion:** The influence of a transmission detector for radiation fields was insignificant except for buildup regions. For MLC test patterns, the COMPASS dose profiles agreed within 3% with those of MapCHECK, EDR2 films, and Monte Carlo simulations, except for complex MLC test patterns. Monte Carlo simulations agreed within 2% with EDR2 in the region more than 50cGy. In clinical examples, COMPASS agreed well with EDR2. COMPASS is a detector having the same accuracy as ion chambers in output measurements and is similar to a film for the dose profiles. The reason is because COMPASS dose distributions are based on measured fluence maps. **Conclusions:** The COMPASS system is useful for dose verification for IMRT plans. The system can use with the similar accuracy to traditional film measurements and 2D detectors. The beam model needs to be improved for complex dose profiles.