

AbstractID: 1299 Title: Static-to-IMRT and Static-to-Static field Matching Using Dynamic Wedge Junctions Generated by a Multileaf Collimator

The conventional single isocenter and half beam technique for field matching is subject to substantial dose errors at the field junction due to imperfect positioning accuracy of the accelerator jaws/MLC. To minimize such effects, we propose a dynamic MLC based wedge junction technique for matching static fields to either static or intensity-modulated fields. The technique requires that static fields be shaped using an MLC with the direction of leaf motion perpendicular to the match line. During treatment, the leaves defining the abutting borders of the static fields move continuously from 1.5cm inside the field to 1.5cm into the adjacent field to generate a 3-cm wide dynamic wedge junction. For static-to-static matching, mutually complementary wedges are created at the junctions. For static-to-IMRT matching, the IMRT fields are optimized by taking the dose contribution from the adjacent static fields into account, thus creating a complementary wedge junction. The technique was tested in several cases of both types of matching. Film measurements in a phantom showed that the dose inhomogeneities due to 1 and 2 mm jaw/MLC position errors were reduced from greater than 20% and 40% to approximately 3% and 6%, respectively. Dose profiles computed by a treatment planning system showed that, for both types of matching, dose inhomogeneities were reduced from 11% and 20% in the conventional technique to less than 3% and 6% in the dynamic technique, respectively. The proposed technique provides a simple and practical method for field matching that substantially reduces potential overdose/underdose to the abutment region.