

AbstractID: 6425 Title: Dosimetry along edges of an irregular MLC field with different stepping angles

Purpose: To measure dose profiles along edges of an irregular MLC field with different leaf stepping angles. So that dependences of dosimetric parameters for the profile on the stepping angle can be measured and investigated.

Methods and Materials: Seven diamond-shaped MLC fields enclosed by a 10×10 cm² square with different stepping angles namely 21.8°, 31.0°, 38.7°, 45.0°, 51.3°, 59.0° and 68.2° were generated using the Varian SHAPER program. The fields were input to the console of a Varian 21 EX linac with a MLC of 120 leaves. Radiographic films were used to measure dose profiles parallel to the field edges. The film was placed at SAD = 100 cm, with 5 cm of solid water slab on top. Photon beam of 6 MV was used for the irradiation. The irradiated film was then developed and digitized using the Vidar VXR-16 film scanner. Film dosimetric analysis was carried out using the RIT 113 system.

Results: Width of profile measured at the 50% relative dose increases with the leaf stepping angle from 21.8° to 45° and then decreases when angle > 45°. Both width of ripple and its relative peak height decrease with increase of the stepping angle. However, profiles having different tongue-and-groove arrangements measured at the positive and negative in-line axis (between the Y1 and Y2 jaw) have similar results.

Conclusions: This study provides measured results to understand the dosimetry along the edge of an irregular MLC field when the leaf stepping angle is varying. The data are expected to benefit the physics modeling of the MLC dosimetry, particularly at the penumbra region for the treatment planning system, and the Monte Carlo simulation related to the irregular segmental MLC field for IMRT.