AbstractID: 10247 Title: A new parameterisation of small photon fields in off-axis regions for the 160MLC

Purpose:

Due to the improved over travel capacities of the SIEMENS MLC160, the application of small fields for stereotactic treatments as well as the possibility of applying intensity modulated irradiation fields within the whole 40 cm x 40 cm usable field size is now possible for the first time. In this work we analyzed dose profiles of small off-axis fields generated with the SIEMENS MLC160.

Method and Materials:

Measurements have been performed for 6 MeV nominal photon energy at a linear accelerator equipped with a 160MLC (Artiste, SIEMENS, Kemnath, Germany). Dose profiles are measured with a diode PTW-60012 (PTW-Freiburg, Germany) in water.

Results:

Larger deviations from symmetrical dose distributions have been found for fields which are generated at the maximum diagonal offaxis positions. Two different methods for an analytical description of the dose distribution generated by these fields are presented, based on the convolution of a rectangular linear-function with a kernel. A sum of two Gaussian distributions as well as a Lorentz-type function are used as such kernels. While the Gaussian method leads to known field parameterization parameters, the Lorentz type kernel offers a larger data reduction and a full analytical description of the profile.

Conclusion:

Both methods offer the possibility of analyzing the underlying fluence profiles. Characteristic parameters of the kernel functions are serving to represent the dose drop off at the field edges. While for the Gaussian method the slope can be expressed in terms of a regular wedge-angle, a linear fluence profile can be applied for the Lorentz method. With this approach an analytical representation of the dose profile is possible which may act as further input for treatment planning systems or data reduction.

Conflict of Interest:

The work was performed in cooperation with SIEMENS Health Care (Kemnath, Germany).