

AbstractID: 8461 Title: Measurement of penumbra using a 2D ionization chamber array

Purpose: Measurement of penumbras associated with jaws and MLCs are problematic in a clinical setting. Typically penumbra are measured by scanning a field profile with a scanning ion chamber, diode or with film. Each measurement modality has a associated with it different difficulties; ion chambers and diodes have a spatial resolution problems, films over respond to low energy photons in the penumbra and umbra regions. These problems affect the results of measurements in the penumbra regions, ion chamber and diode measurements convolve the resolution of the detector with the penumbra function, while film overestimates the values in the low dose regions of the penumbra and umbra. This work reports the results of using a 2D ionization array ((MatriXX, Scanditronic-Wellhofer) to measure penumbra regions.

Method and Materials: The 2D ionization array consists of 1020 separate ionization chambers. The array is arranged in a 32 X 32 chamber grid with the four corner chambers missing. Each chamber is 7.6 mm on center with an active volume of 0.03 cm³. Results from this group have been report previously using this array for IMRT measurements. In this work the penumbra is measured by placing a rotated jaw edge within the area of the array and using a blind deconvolution to determine the spatial response of the detectors and the shape of the penumbra simultaneously.

Results: Results of penumbra reconstruction for various field sizes and depths are reported. These results are compared to ion chamber scanning methods and film.

Conclusion: Use of the 2D array to measure penumbra widths show good agreement with ion chamber scanning measurements and do not suffer from over response of film measurements in the low dose regions. An average spatial response of the detectors is also determine simultaneously by this procedure.

Conflict of Interest (only if applicable): None.