

AbstractID: 4470 Title: Sensitivity of document scanners used for radiochromic film dosimetry

Purpose: The use of color CCD-based document scanners, having an ability to perform scans in the transmission mode, has been suggested as an inexpensive option in the process of radiochromic film dosimetry. These scanners allow acquisition of transmission scans in up to a 48-bit red-green-blue (RGB) mode. Since the absorption spectrum of the radiochromic film exhibits a maximum in the red region of the visible spectrum, extraction of the red channel from the RGB image improves document scanner sensitivity when used in combination with radiochromic films. However; transmission scanners use a linear CCD array that suffers from a difference in response along the array. In this work, we present our measurements of the spatial response of an AGFA Arcus II document scanner used for radiochromic film dosimetry.

Method and Materials: To create various pixel value levels, we employed 5 neutral density filters and their combinations. The profiles were fitted with the sixth order polynomial and consequently used for image correction. The sensitivity curves have been created by normalizing their values to the central profile value.

Results: In the regions close to scanner bed edges, the non-uniformity of the raw pixel data depends on the pixel level detected by the CCD array and can be as large as 15%. Over the 80% of the scanning region, the uniformity is of the order of 2% after corrections are applied. However in areas close to the left and right edges of the scan deviations can reach 5% even after the correction.

Conclusions: We have demonstrated that in transmission scanners, using linear CCD array detectors, a considerable change in sensitivity may occur along the detector array direction. If not properly corrected for, this spatial sensitivity may obscure a 2D accuracy of the radiochromic film dosimetry.

Conflict of interests: Research is sponsored by ISP.