

AbstractID: 1975 Title: Factors Affecting Compensator Design for kV Conebeam CT

The development of cone-beam CT as an image-guidance technology for precision radiation therapy promises to alter the use of conventional medical linear accelerators. While the fundamental performance of this approach has been well investigated, there is significant room for further optimization of these systems as they move into clinical use. One area of investigation that deserves further attention is in the design of two-dimensional compensators. These compensators can be employed to accommodate the limited dynamic range of flat-panel detectors, optimally distribute the imaging dose within the patient, and modulate the magnitude of x-ray scatter reaching the detector. Several factors influence the design of the compensators including: uniformity of the x-ray spectrum, spectral hardening, patient size, material properties, and, mechanical constraints (mass, height, presence of geometric flex). A software tool has been constructed to assist in the design of such compensators. This tool permits calculation of compensator shape depending on patient size (degree of compensation), x-ray energy, and material. Investigations of spectral hardening (HVL Cu) across the cone-beam have been performed to permit accurate design of these compensators. The challenges associated with compensation design and the constraints on their use will be discussed.

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