

In a previous study we investigated the use of the kinestatic charge detector (KCD) for computer tomography (CT) reconstruction. In that study we used a diagnostic x-ray beam setting as a first step towards our goal of developing a megavoltage CT reconstruction protocol employing the KCD as the radiation detector. In the present study we report on our results in the megavoltage energy range.

The KCD used in this research is the small-field-of-view (SFOV) detector. The detector consists of 384 collector channels spaced 0.2 mm apart, giving a field-of-view (FOV) of 7.68 cm. The digital acquisition system (DAS) is the same as that of the LFOV imaging detector. The detector was pressurized to 100 atm with a gas mixture of 1.5% dimethyl ether, 1% hydrogen, and 97.5% Xenon.

In this paper we present the images reconstructed using a head phantom (Rando-phantom) using a total of 92 projections. The reconstruction was carried out using the multi-level scheme algebraic reconstruction technique (MLS-ART) developed by one of the authors. In this technique satisfactory images are generally obtained after one iteration, which in effect makes ART a noniterative algorithm. We also present the CT images obtained using the back projection technique for comparison purposes. We compare the KCD results with the CT images obtained using the EPID system at the same settings.

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