AbstractID: 2081 Title: Reduction of Aliasing Artifacts in Cone-beam CT Images Using Data Derivatives with Respect to Detector Coordinates

Helical cone beam CT has a number of advantages over the conventional CT. The algorithm developed recently by Katsevich represents a major theoretical breakthrough for image reconstruction in helical CT. This algorithm, however, involves an explicit calculation of derivatives of the data along helix. In this work, we present a new approach to computing more accurate the derivatives of data. In our approach, the derivatives of the data along the helix become the derivatives with respect to detector coordinates. Because the samples on detector are generally much denser than those along the helix, our approach can yield quantitatively more accurate data derivatives than does the Katsevich algorithm, thus leading to reconstructed images with less aliasing artifacts. We performed numerical studies to quantitatively compare the performance of the existing and proposed approaches. Quantitative results in these numerical studies clearly demonstrate that algorithms with our proposed approach for computation of data derivatives always yield images of higher quality and accuracy than do the algorithms with the explicit data-derivative along the helix. In conclusion, we have derived a new formula for computing quantitatively more accurate data derivatives and thus more accurate image reconstruction in helical cone-beam CT.