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## Analysis of Cone-Beam Artifacts in off-Centered Circular CT for Four Reconstruction Methods

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### Abstract

Cone-beam (CB) acquisition is increasingly used for truly three-dimensional X-ray computerized tomography (CT). However, tomographic reconstruction from data collected along a circular trajectory with the popular Feldkamp algorithm is known to produce the so-called CB artifacts. These artifacts result from the incompleteness of the source trajectory and the resulting missing data in the Radon space increasing with the distance to the plane containing the source orbit. In the context of the development of integrated PET/CT microscanners, we introduced a novel off-centered circular CT cone-beam geometry. We proposed a generalized Feldkamp formula ( $\alpha$ -FDK) adapted to this geometry, but reconstructions suffer from increased CB artifacts. In this paper, we evaluate and compare four different reconstruction methods for correcting CB artifacts in off-centered geometry. We consider the  $\alpha$ -FDK algorithm, the shift-variant FBP method derived from the T-FDK, an FBP method based on the Grangeat formula, and an iterative algebraic method (SART). The results show that the low contrast artifacts can be efficiently corrected by the shift-variant method and the SART method to achieve good quality images at the expense of increased computation time, but the geometrical deformations are still not compensated for by these techniques.

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