

International Journal of Biomedical Imaging

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A General Formula for Fan-Beam Lambda Tomography

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Abstract

Lambda tomography (LT) is to reconstruct a gradient-like image of an object only from local projection data. It is potentially an important technology for medical X-ray computed tomography (CT) at a reduced radiation dose. In this paper, we prove the first general formula for exact and efficient fan-beam LT from data collected along any smooth curve based on even and odd data extensions. As a result, an LT image can be reconstructed without involving any data extension. This implies that structures outside a scanning trajectory do not affect the exact reconstruction of points inside the trajectory even if the data may be measured through the outside features. The algorithm is simulated in a collinear coordinate system. The results support our theoretical analysis.

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