

X-ray computed tomography with transverse truncation: focus on the DBP method

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Abstract: Medical scanners allow the reconstruction of an image of a part of a patient's body from X-rays projected through it. This presentation deals with the image reconstruction problem with analytical methods. More precisely, we are interested in the problem of truncated data, i.e. when some lines intersecting the object and the X-ray source are not measured. In this case, the known methods for image reconstruction are strongly reduced. A reconstruction cannot be stable if the object is outside the Tuy region, often corresponding to the convex hull of the trajectory. It appears that the most suitable method for truncation, especially transverse ones, is the DBP (Differentiated Backprojection) method. It requires the use of chords of the X-ray source trajectory. We study more particularly a precise class of trajectories, which we call n -sin trajectories, and we work on use of DBP with these n -sin trajectories. For instance, the 2-sin trajectory is better suited to the DBP method than the other trajectories. It turns out that even with transverse truncation and in chordless regions, reconstructions in the convex hull of the X-ray source trajectory are sometimes possible, which is not addressed in the literature.