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On some variational models and their algorithms for axially symmetric objects tomography from a single X-ray source. (Chinese. English summary) Zbl 1499.94006

Summary: In this paper, we present some variational models and their computational algorithms to reconstruct density distribution of an axially symmetric object by X-ray radiographs, generalizing previous works on spherically symmetric objects. Since effective numerical solution of the nonlinear systems generated from these models remains a mathematical challenge, the proposed use of an augmented Lagrangian method enables incorporation of high order regularization and an automatic adding of regularization in the case of additional blurring. Some preliminary tests are conducted. This work lays the foundation for future works to model 3D non-symmetric objects by X-ray radiographs.

MSC:
94A08 Image processing (compression, reconstruction, etc.) in information and communication theory

Keywords:
X-ray tomography; image reconstruction; variational models; regularization; Abel inversion

Full Text: DOI