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Tomographic Image Reconstruction in the Case of Limited Number of X-Ray Projections Using Sinogram Inpainting

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Abstract: In many medicine and industry applications, a precise X-ray tomography reconstruction of the internal objects structure is of great importance for reliable interpretation data. The tomography allows obtaining a spatial distribution of the internal materials structure. In certain experiments conditions, the projection data acquisition is guided by angle limitations or a restricted angle, this requires a subsampling of the projections number or a partial data absence. Accordingly, the reconstructed images may suffer from severe artefacts especially with the presence of noise. In this context, the purpose of this paper is to propose a tomographic image reconstruction method based on FBP associated to sinogram inpainting. The studied inpainting technique is based on first order variational methods such as the Chambolle-Pock algorithm. This method allows the quality improvement of the reconstruction images tomographic with reduced number of projection. The PSNR is improved by 7 to 10 dB in the reconstructed image compared to the classical FBP reconstruction.

Keywords : x-ray tomographic, image reconstruction