

Nonlinear Characteristic of Sinogram for White X-ray and Superiority ART method rather than Fourier transform method for CT-imaging Reconstruction

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So far, the CT-imaging reconstruction algorithm mainly use Fourier transform method and ART(Algebraic Reconstruction Technique)method. Especially Fourier transform method is based on that the sinogram is linear for X-ray(single color)absorption coefficient on the object materials. However strictly speaking, usual CT use White X-ray, then the sinogram is not linear for X-ray absorption coefficient. For this reason, in low energy region of X-ray photons or in the case of the metal of object, X-ray absorption coefficient is relative large, then the nonlinearity effect of sinogram appears. When the Fourier transform method generates the noise(artifact) of imaging. So I can show that ART method conquers this non-linear problem of sinogram mathematically. This proof is constructed as a following. First this nonlinear sinogram expression divide two parts, one is the related part of X-ray photon energy distribution, one is the part of exponent containing the linear sinogram. Next digitalizing and giving some suitable condition, this sinogram expression become to the fundamental modeling expression of ART method. So ART method conquer.

This mathematical proof means that we have established the strong approach by using ART method theoretically. So this consideration will contributed to more developments for Sequential Approximation Method(Gordon,1970)or SIRT(Simultaneous Iterative Reconstruction Technique)method as the computing realization of ART method.

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