

Poisson Property of Sinogram and Related Mathematics

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The Photon Counting in Sinogram of CT is according to the Poisson distribution of X-ray photons. And every Sinogram contains the components of Pixel imaging, and every components receive the photons. So the numbers of photons in the components are the random numbers according to the Poisson distribution. Adding these random numbers, that is Sinogram become to the random numbers according to the Poisson distribution. (So called "Additional Reproduce Property of Poisson Distribution".) The Sinogram component is the projection probability(random number) times the Pixel value(deterministic value).And the important parameter of Poisson distribution of Sinogram component λ ,can be explained by the Pixel values. The Poisson distribution has the moment generating function(m.g.f.)and has the probability density function(p.d.f.) via some Integral formula. Then we get the stochastic property of the projection probability of Sinogram including its p.d.f. ,so we show the expectation of Sinogram data become to the harmonic mean of the data.

Topics

Session C. Applied optics and engineering

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