理论研究

编码孔径成像系统中的点扩散函数

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摘要   在X光编码孔径成像系统中，
系统的点扩散函数决定成像系统的成像质量。由于系统的点扩散函数可用来求解系统的传递函数，
并可由此制作实现图像重构的滤波器，
因此点扩散函数的精确程度直接影响重构过程中图像的质量。本文以标量衍射理论为基础，
从理论上推导出了衍射效应条件下编码孔径中圆环的点扩散函数，
并将它用于制作光学系统的滤波器。最后利用Wiener滤波函数对编码重叠像的频谱分布进行滤波处理，
再经过逆傅里叶变换得到了重构图像。

关键词   菲涅耳衍射   点扩散函数   编码孔径

分类号

Point Spread Function in Coded Aperture Imaging System

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Abstract In the study of X ray coded aperture imaging system, it's known that the point spread function(PSF) decides the performance of a imaging system. MTF can be deduced by PSF and the filter used in image reconstruction can be made thereby, so the accuracy of PSF directly affects the performance of reconstructed image. In this paper, based on the scalar theory， PSF is obtained theoretically under the condition of considering diffraction effects. The filter of the optical system is fabricated based on PSF. The filtering processing for the frequency distribution of coded overlapping image was done with Wiener filtering function and then the reconstructed image was obtained through the inverse Fourier transformation.

Key words   Fresnel diffraction   point spread function   coded aperture

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