

成像技术与图像处理

TDI-CCD图像固有条带噪声的消除方法及实现

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摘要:

存在于TDI-CCD图像中的条带噪声会影响图像的质量,降低系统的测量精度。针对TDI-CCD图像固有条带噪声的灰度值在原始信息中变化比较缓慢的特点,利用傅里叶变换域内的频谱图映射确定条带噪声频率的方法,分别采用低通、带阻滤波器对条带噪声进行消除。另外,提出了一种改进阈值的小波变换法来消除条带噪声,该方法能在小波分解后各个尺度的垂直方向上自适应地确定阈值。实验结果表明在消除条带噪声方面,改进阈值的小波变换法优于传统的傅里叶变换法。在整个频率域内,改进阈值的小波变换法能够较彻底地消除条带噪声,同时较好地保持了原图像的特征。

关键词: TDI-CCD 条带噪声 傅里叶变换 小波变换 自适应阈值

Methods and Realization for Removing Inherent Stripe Noises in TDI-CCD Images

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Abstract:

The existence of stripe noises influences the qualities of TDI-CCD images, and reduces the measurement accuracy of the system simultaneously. For the characteristic of slow change of the stripe noises grey level compared with the primary information, the stripe noises are eliminated via low-pass filter and band-elimination filter separately using the method of determining the stripe noise frequency through the frequency spectrum mapping in the Fourier transform domain. Moreover, an improved threshold of Wavelet Transform method of eliminating stripe noise is presented in this paper. The each vertical direction's threshold in various scales is determined by itself after the wavelet decomposition. It is proved that in removing the TDI-CCD stripe noises, the improved threshold of Wavelet Transform is better than the traditional Fourier Transform. The stripe noises can be removed drastically via the improved threshold of Wavelet Transform method, the goal which reserves the spectral characteristic of original image is also achieved.

Keywords: TDI-CCD stripe noises Fourier transform wavelet transform adaptive threshold

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