

论文

TDI CCD光子响应非均匀性噪音分析与测量

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摘要:

探测器光子响应非均匀性噪音会降低低照度情况下遥感成像系统的成像质量. 针对这一现象, 本文首先结合探测器的物理性质, 对各种噪音源进行了研究; 建立了TDI CCD不同级数下的光子响应非均匀性噪音模型, 随着曝光量的增加, 光子响应非均匀性噪音也线性增加. 其次根据曝光级数越多TDI CCD对非均匀性噪音的平滑效应越明显这一现象, 提出一种光子响应非均匀性系数与曝光级数之间的关系式, 并给出了利用TDI CCD输出图像提取光子响应非均匀性噪音的方法. 最后建立了试验系统, 通过试验对测试获得的光子响应非均匀性噪音与理论分析计算得出的结果进行了分析.

关键词: 时间延迟积分电荷耦合器件 光子响应非均匀性噪音 噪音测量

Modeling and Experimental Investigation on the PRNU Noise of TDI CCD

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Abstract:

Photo response non uniformity (PRNU) noise sets a fundamental limit on image sensor performance, especially under low illumination in remote sensing system. After introducing a complete noise model of time delay and integration charge coupled device (TDICCD), a complete model of TDICCD noise is proposed. Then PRNU noise model for all selectable integration stage is developed, which is linearly related to illumination. Moreover, exposure stages are taken into consideration due to their inherent averaging effect, and relationship between nonuniformity parameter and integration stage is developed. Finally a technique to identify and measure the PRNU noise in TDICCD is presented by analysis of the output images, and the experimental results are illustrated from test system, measured PRNU noise at different illumination and integration stages are also analyzed.

Keywords: Time Delay and Integration Charge Coupled Device (TDI CCD) Photo Response Non Uniformity (PRNU) noise Noise measurement

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