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现代应用光学

激光光斑位置精确测量系统

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**摘要：**设计了一种激光光斑位置测量系统,用于提高激光照射器监测系统测量激光光斑位置时的测量精度。分别介绍了测量系统的组成及它们的信号连接关系。针对激光光斑图像采集过程中的后向散射现象,提出基于异步距离选通的激光后向散射抑制技术。为了克服大气湍流扰动对激光光斑成像的影响,利用改进的盲解卷积算法对激光光斑图像进行事后图像处理。最后,对光斑图像进行畸变校正,并利用高斯曲面拟合算法提取光斑位置。设计了若干仿真实验,并应用该系统处理了实际外场实验。结果表明,所设计的激光光斑位置测量系统的测量精度不超过0.3 pixel。

**关键词：**激光光斑 位置测量 激光后向散射 盲解卷积算法 大气湍流 短波红外

Precise position measuring system for laser spots

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**Abstract:** A laser spot measuring system was designed to improve the position precision of a laser designator surveillance systems. All the components of the laser spot measuring system were introduced, respectively, and the relationship of all connected signals among these components was given. According to the laser backscattering in collecting laser spot images, a method was proposed to restrain the laser backscattering based on an asynchronous range-gating technology. To weakening the impact of atmospheric turbulence on laser spot imaging, an improved blind deconvolution algorithm was applied to the image process after the events for the laser spot image. Finally, the distortion of the spot image was adjusted and the spot position was computed by Gauss surface fitting method. The simulation experiments were designed and a practical field experiment was performed by the proposed system. The experimental results show that the precision of this laser spot measuring system is better than 0.3 pixel.

**Keywords:** Laser spot position measurement Laser backscattering Blind deconvolution algorithm Atmosphere turbulence shortwave infrared

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