激光技术 2014, 38(1) 44-48 DOI: 10.7510/jgjs.issn.1001-3806.2014.01.010 ISSN: 1001-3806 CN: 51-1125/TN

激光与光电子技术应用

低慢小目标面阵推进式激光成像探测方法研究

李达, 李云霞, 蒙文, 韩晓飞

空军工程大学 信息与导航学院, 西安 710077

摘要： 为了解决空中低慢小目标探测存在“发现难、识别难、跟踪难”的问题，提出了一种面阵推进式激光成像探测方法。采用面阵探测器对场景选通成像，通过车载成像系统的行进来实现多帧不同场景图像的获取，并运用一种特定的距离映射关系来实现对观测场景的3维重构。以低空小型飞行物为目标，设计了成像探测系统的基本参量，并从激光二极管阵列单元、脉冲宽度与重复频率、大气衰减、信噪比和脉冲峰值功率等方面分析了成像探测系统的基本性能。结果表明，在低空范围内，面阵推进式激光成像探测方法可有效对大面积空域进行快速3维成像，缩短图像生成时间，为下一步的系统工程实现提供了理论和技术指导。

关键词： 成像系统 激光主动成像 距离选通 对空探测

Research of plane array propelled laser imaging detection for small targets at low altitude and slow speed

LI Da, LI Yunxia, MENG Wen, HAN Xiaofei

School of Information and Navigation, Air Force Engineering University, Xi'an 710077, China

Abstract: In order to solve the difficult problem of finding, identifying and tracking a low altitude, slow speed small target, a new technology of array propelled laser imaging method was proposed. With range-gated imaging model, different images of the scene were obtained by the moving forward vehicle system. According to the principle of plane array propelled imaging method, a 3-D reconstruction calculation about the successive range-gated images was introduced. Aiming at the characteristics of a low altitude, slow speed small target, the basic parameters of imaging detection system were designed. The performance of the system was studied including array elements, pulse repetition frequency, pulse duration, atmospheric attenuation and signal to noise. The results show that in low-flying area, this technology can be used to quickly imaging for 3-D observation scene, shortening the time required for images generation and could provide a guideline for the future system realization.

Keywords: imaging system laser active imaging range-gated air detection

收稿日期 2013-03-16 修回日期 2013-05-16 网络版发布日期 2013-12-02

DOI: 10.7510/jgjs.issn.1001-3806.2014.01.010

基金项目:

通讯作者: 李云霞

作者简介: 李 达（1989- ），男，硕士研究生，主要从事激光成像技术的研究。

作者Email: liyunxia_lyx@126.com

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