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论文

基于变积分时间的红外焦平面非均匀性校正算法研究

陈世伟, 杨小冈, 张胜修, 王一

第二炮兵工程大学 303教研室, 西安 710025

摘要:

针对两点温度定标算法在应用过程中曝露的问题,提出了基于变积分时间的红外焦平面非均匀性校正算法.该算法先对图像进行非线性压缩,转换为线性图像,再利用红外焦平面阵列探测元的响应特性与积分时间之间的关系,采用改变积分时间的方法拟合红外焦平面探测器的平均响应特性曲线,进行两点校正,然后对结果进行取指数操作,即得到原图非均匀校正后的图像.分别利用两点温度定标法和变积分法对航拍红外图像进行校正效果验证,同时进行了不同校正算法的非均匀性适应性评价实验.实验结果表明新算法计算量小,校正准确度高,反应速度快,并在一定程度上解决了大动态范围下响应非线性对校正性能的影响,具有很好的工程应用价值.

关键词: 变积分时间 非均匀校正 非线性模型 红外焦平面阵列

Research on Nonuniformity Correction Algorithm of IRFPA Based on Adjusting Integral Time

CHEN Shi-wei, YANG Xiao-gang, ZHANG Sheng-xiu, WANG Yi

303 Section, The Second Artillery Engineering University, Xi'an 710025, China

Abstract:

According to the problems of two temperature points correction algorithm in application, a nonuniformity correction algorithm witch based on adjusting integral time is presented. In this algorithm, the nonlinear image data is translated into the linearized one firstly, then by using the relationship of IRFPA between response characteristic and integral time, the response curve of IRFPA is fitted by adjusting the integral time. And two point calibration correction is used. Finally the exponent of the corrected linearized image data is calculated and the uniformity image of the original one is achieved. The effect of correction aerial infrared image is verified by two temperature points correction algorithm and adjusting the integral time method, and this assessment method for the adaptability of nonuniformity is used in different nonuniformity correction methods. Experimental results indicate that the new algorithm has better engineering practice significance because of its characteristics of small calculating amount and fast speed, and high precision. The algorithm of the nonlinear response model of IRFPA reduces the influence of the detector nonlinear response to the nonuniformity correction performance in large dynamic range in some degree.

Keywords: Adjusting integral time Nonuniformity correction Nonlinear model Infrared Focal Plane Arrays(IRFPA)

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