

光电系统与工程

超大视场红外告警系统的成像特点分析

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摘要:

为了设计出适用于超大视场红外鱼眼告警系统的有效算法,对超大视场红外鱼眼告警系统所拍摄的红外图像进行分析,结果发现:超大视场红外图像中目标只表现为一个点,红外图像的背景非常复杂;对于天空背景,随着仰角的增大,其辐射亮度逐渐变小,目标的运动轨迹被弯曲,并随视场角的增大其弯曲程度越甚.从红外鱼眼镜头的设计理论出发,对系统的像面照度进行了分析,并采用美国光电工业公司的CDS100-04型黑体作为标准辐射源对分析结果进行了实验验证,结果表明:不同位置处灰度值的相对标准偏差仅为2.26%,说明该系统的像面照度是均匀的;最后,对系统的作用距离进行了分析,其作用距离约为9.6km,基本满足实际需要.

关键词: 超大视场 红外鱼眼告警系统 红外图像 成像分析

Image analysis of ultra-wide field of view infrared warning system

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Abstract:

To design proper algorithms for ultra-wide field of view (FOV) infrared fisheye warning system, the infrared image taken by the ultra-wide FOV warning system was studied. The target in the infrared image is a point target, and its background is complicated. For the sky background, its radiance will decrease and target moving track will be bent as the elevation angle increases. Such situation is deteriorated with the increase of FOV angle. Based on the design theory of the infrared fisheye lens, the illumination of the system image plane was analyzed and calibrated with CDS100-04 black body. It is found that the relative standard deviation of the gray value in different positions is only 2.26%, which indicates good image illumination uniformity. Finally, the detection distance of this system is analyzed, which is about 9.6km.

Keywords: ultra-wide field of view infrared fisheye warning system infrared image imaging analysis

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