

论文

3.7μm~4.8μm波段折/衍混合红外光学系统的无热化设计

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摘要:

研究了混合式红外光学系统的光学无热化设计方法, 在设计中引入了热差互补的设计思想, 将无热化应满足的设计方程作为CODE V中优化的约束条件, 设计出工作于3.7μm~4.8μm波段、F/#为2、视场角为±5°、焦距为70mm的具有100%冷屏效率的折/衍混合式消热差物镜。该系统在-40℃~60℃温度范围内成像质量接近衍射极限, 可供像元大小为15μm的高分辨率致冷型凝视焦平面探测器使用。

关键词: 无热化; 红外光学系统; 折/衍混合光学系统系统

Athermal design of refractive/diffractive hybrid infrared optical system working at 3.7μm~4.8μm

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Abstract:

A method to design the hybrid athermal infrared optical system is studied. A design concept of the mutual compensation of the thermal dispersion and chromatic dispersion was introduced in the design, in which the equations that the athermal design should meet are acted as a constraint condition in the optimization. A refractive/diffractive hybrid athermal infrared optical system, whose cold shield efficiency is 100%, F/number is 2, field of view is ±5°, effective focal length is 70mm and working wavelength is 3.7μm~4.8μm, is designed. The image quality of the system approaches the diffraction limit at the working temperature of -40℃~60℃. The system can be compatible with the high-resolution cooled staring focal plane detector whose pixel size is 15μm.

Keywords: athermalization; infrared optical system; refractive/diffractive hybrid optical system

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