

光电系统与工程

折/衍混合超轻小型投影式头盔光学系统设计

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摘要:

投影式头盔系统具有成像质量高,结构轻便等特点。分析投影式头盔光学系统设计参数的选择原则,并基于投影式物镜引入对角为1.55cm的新型OLED显示器作为图像源,采用折射/衍射混合结构来减轻光学系统的体积和重量。通过ZEMAX软件对系统进行优化,设计得到一款质量仅1.35g,直径11.32mm的超轻小型三片式头盔显示器光学系统。系统中心视场MTF在32lp/mm处达到了0.52,在该空间频率下对应人眼的分辨率为1.85',在大视场处,子午和弧矢MTF也均大于0.2,分辨率满足SVGA显示模式要求。

关键词: 光学系统 头盔显示器 投影物镜

Design of compact diffractive-refractive hybrid optical system in ultra-light projective helmets

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Abstract:

The helmet display being an important part of soldier digital equipments is always a hot spot in the field of high-tech military. The selection criterion for the design parameters of the projective helmet display is analyzed. The new 1.55cm OLED display was taken as the image source based on projection objective. The volume and weight of the optical system were reduced with the refractive/diffractive hybrid structure. The ultra-light and compact optical system for the 3-element helmet display was obtained by means of the system optimization with ZEMAX software. The weight of the optical system is only 1.35g and the diameter is 11.32mm. The resolution corresponding to the human eyes is 1.85' under the condition of the spatial frequency. The meridian and sagittal MTFs are all more than 0.2 at the wide FOV. The resolution meets the requirement of SVGA display mode.

Keywords: optical system helmet display projection objective

收稿日期 修回日期 网络版发布日期

DOI:

基金项目:

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