

光纤技术

改善光纤倒像器的对比度传递特性

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摘要 光纤倒像器是一种特殊类型的光纤板, 可将传递图像直接倒转 180° 并应用于像增强器。由于光纤倒像器的特殊结构, 造成光纤随着距扭转轴心的距离增加, 数值孔径和光通量逐渐下降。相对于光纤板, 光纤倒像器在透过率和对比度传递特性上均有一定程度的下降。通过改进玻璃系统, 在一定程度上降低芯皮玻璃间离子扩散和相互渗透的程度, 可提高光纤倒像器的实际数值孔径; 通过调节EMA吸收量, 既能满足像增强器对光纤倒像器荧光屏透过率的要求, 又能保证最大程度地吸收光纤中逸出的杂散光, 提高对比度。选择合理的芯皮比, 不仅可弥补因扭转拉伸造成的皮层厚度减薄, 还可进一步增加皮层厚度, 抑制光从光纤中逸出。通过以上改进, 可改善光纤倒像器的对比度传递特性。

关键词 [光纤倒像器](#) [数值孔径](#) [芯皮比](#) [对比度传递函数](#)

分类号

Improvement of image inverters contrast transfer performance

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Abstract Image inverter is a special type of fiber optic plate, which can directly invert an image by 180° to an image intensifier. The device is making the night vision goggle more compact by integrating the image transfer and image invert function into a phosphor substrate. But due to the image inverter's special structure, the numerical aperture and luminous flux decrease gradually with the increase of the radial distance from torsion axle centre. Compared with the fiber optic plate, the image inverter has lower contrast transfer function and lower transmissivity. By improving the glass system to reduce the ion diffusion and inter permeation which may occur to the core cladding interface, the actual numerical aperture of the fiber image inverters can be improved. By means of adjusting EMA absorption, not only the needs of image intensifiers can be reached for the transmissivity of fiber image inverter screens, but also the stray light escaping from the optical fiber can be absorbed to the full extent to improve the contrast. With the selection for a reasonable core cladding ratio, the cladding thickness reduction caused by torsion stretch can be remedied and also the cladding thickness can be increased further more to restrain the light to escape from fibers. The result shows that the innovation mentioned above can improve the contrast transfer characteristics of fiber image inverters.

Key words [fiber image inverter](#) [numerical aperture](#) [core cladding ratio](#) [contrast transfer function](#)

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