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光电系统与工程

数字化光学元件中黑栅效应的研究

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摘要：

计算机光学元件是纯相位元件，能够产生任意形状的波面分布，但存在着加工工艺过于复杂的缺点。目前出现了用数字化元件实现计算机光学元件的方法，在这些方法中经常要面临黑栅效应的干扰。利用傅里叶光学理论研究了黑栅效应对具体元件的影响程度，找出了影响黑栅效应强弱的因素，并用MATLAB软件进行了模拟。模拟结果表明：减小黑栅的宽度可使光能量向接收屏中央集中，有效降低黑栅效应的干扰。

关键词： 激光束整形 黑栅效应 标量衍射理论

Black-matrix effect in digitized optical elements

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Abstract:

The computer optical elements (COE) are pure-phased elements, which can shape the laser beam to arbitrary shape, but is very complicated in their processing technic. Now some methods to realize the COE by digitized elements turn up, but the interference from the black-matrix effect is non negligible when using these methods. The influence of the black-matrix effect on the certain elements was researched by means of the Fourier optics theory, the factors to influence the black-matrix effect were found out and the corresponding simulation was carried out with MATLAB. The result shows that the energy concentrats to the center of the receiving screen when reducing the width of the black-matrix, and then the interference of black matrix effect is decreased effectively.

Keywords: laser beam shaping black-matrix effect scalar diffraction theory

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