

光电系统与工程

光学综合孔径成像技术实验研究

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摘要:

根据光学综合孔径成像系统的成像质量与点扩散函数和光学传递函数的关系,以Golay-3阵列结构为例,从空间域和频率域对光学综合孔径成像技术进行理论仿真和实验研究。在空间域从理论上分析光学综合孔径成像系统的点扩散函数,对复杂目标的成像通过目标函数与点扩散函数的卷积求得,点扩散函数决定了成像质量。通过数值仿真和模拟实验取得了点扩散函数强度分布图,两者分布规律一致证明理论分析正确。在频率域研究光学综合孔径调制传递函数,理论仿真和实验取得的调制传递函数表明,空间域和频率域内光学综合孔径成像技术的理论分析与实验结果具有较好的一致性。

关键词: 光学综合孔径 光学传递函数 点扩散函数 成像系统

Experimental study of optical synthetic aperture imaging technology

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Abstract:

Based on the relations between the imaging quality with point spread function and optical transfer function, taking Golay-3 array as an example, the theoretical simulation and experiment for the optical synthetic aperture imaging technique are implemented in spatial and frequency domains. The point spread function and optical transfer function is the basis for optical synthetic aperture design and optimization. The imaging of complex objects can be obtained by the object function convoluting with the point spread function. The point spread function determines the imaging quality. The intensity distribution diagrams of the point spread function were acquired by the digital simulation and simulated experimental. The optical transfer function of optical synthetic aperture system was achieved from the point spread function. The simulation and experimental results are analyzed and compared. The experimental results agree well with the theoretical analysis. It proves the validity of the theoretical analysis.

Keywords: optical synthetic aperture optical transfer function point spread function imaging system

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