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3种圆孔衍射的两种计算方法研究

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摘要:

根据菲涅耳-基尔霍夫衍射积分公式,给出点源、平面光以及高斯光束照射圆孔衍射的一种数值计算方法,借鉴相关方法推导了这3种圆孔衍射的菲涅耳衍射及其特殊情况下夫琅禾费衍射的解析计算式,并利用Matlab软件模拟了它们傍轴区的衍射场。模拟实验表明:这两种计算方法对这3种常见且重要的圆孔衍射都是有效可行的。

关键词: 圆孔衍射 菲涅耳-基尔霍夫衍射公式 高斯光束 数值计算 解析计算 洛默尔函数

Two calculation methods for three kinds of circular aperture diffraction

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Abstract:

According to the Fresnel-Kirchhoff diffraction integral formula, numerical calculation methods for the circular aperture diffraction irradiated by a point source or a plane light or a Gauss beam are given. The analytic calculation formula for these three kinds of circular aperture Fresnel diffraction and their special circumstance Fraunhofer diffraction are deduced with correlation methods, and their paraxial zone diffraction fields are simulated with Matlab software. The simulations show that these two calculation methods for the three kinds of common and important circular aperture diffraction are effective and feasible.

Keywords: circular aperture diffraction Fresnel Kirchhoff diffraction formula Gaussian beam numerical calculation analytic calculation Lommel function

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