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光电系统与工程

高斯光束通过非线性折射和吸收介质的光强分布

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摘要：

以衍射理论为基础，推导并模拟了高斯光束通过非线性折射和吸收效应介质后的远场光强分布。结果表明：入射高斯光束引起的介质折射率变化和光束波前曲率影响介质出射面光束的径向调制相位，安装在焦点前的有自聚焦效应的介质和安装在焦点后的有自散焦效应的介质具有闪耀光栅的能力，使远场出现中心为暗斑外侧为亮环的衍射图样。非线性折射效应为主的介质，其非线性吸收效应的变化同时改变远场衍射图样的数目和光强值，但对于非线性吸收效应为主的介质，衍射图样的数目随吸收效应的变化不明显，吸收效应只影响光强值。

关键词： 高斯光束 非线性折射 非线性吸收 径向调制相位

Intensity distribution of Gaussian beam transmitting through medium with nonlinear refraction and absorption

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Abstract:

The far-field intensity distribution of Gaussian beam transmitting through medium with both nonlinear refraction and absorption was derived and simulated on the basis of diffraction theory. The simulation results show that both the refractive index change of the medium and the wave-front curvature caused by input Gaussian beam influence the radial modulation phase of the beam emitting from the medium exit surface, and that both the medium with self focusing effect putting in front of the focal point and the medium with self-defocusing effect putting behind the focal point have the diffraction ability similar to blazed gratings which can form a diffraction pattern having a series of bright rings with dark spots in the center of them. If the nonlinear refraction of the media is great, nonlinear absorption affects both the distribution and the intensity of the rings; but if the nonlinear absorption is great, it only affects the intensity.

Keywords: Gaussian beam nonlinear refraction nonlinear absorption radial modulation phase

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