

非线性光学

外加交变电场情况下屏蔽明孤子自偏转特性研究

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摘要:

用微扰法从理论上计算了外加交变电场的光折变晶体中屏蔽明孤子的自偏转特性, 在外加交变电场的有效电场方向与晶轴方向一致的情况下, 晶体中形成屏蔽明孤子, 其自偏转方向偏向晶轴反方向, 并且孤子中心的偏转轨迹为一抛物线, 当传播距离为一定值时, 其偏转距离与外加交变电场值的三次方、光强调制度分别成正比, 当孤子中心光强与暗辐射强度的比值为10时, 光孤子的偏转距离最大。伴随自偏转的同时, 光孤子中心的空间频率随着传播距离由低频向高频线性移动, 导致光孤子的横截面振幅分布发生了变化, 偏转方向的曲线斜率变大, 反方向的曲线变得平坦。

关键词: 非线性光学 自偏转 微扰法 屏蔽明孤子 交变电场

Self-deflection of screening bright soliton in photorefractive crystal applied alternating electric field

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Abstract:

Self-deflection characteristics of screening bright soliton in photorefractive crystal applied alternating electric field were discussed by adopting the perturbation method. This soliton is formed in the crystal when the direction of effective electric field of alternating electric field is along with crystal axis, while the self-deflection of the soliton orients the direction opposite crystal axis. Moreover, the deflection distance of the soliton center moving along a parabolic trajectory is proportional to the modulation degree of light intensity and third power of alternating electric field respectively. It is worth to mention that this distance reaches maximum value for the ratio of center light intensity of soliton to the dark radiation intensity up to 10. Besides, the spatial frequencies of soliton center, along with self-deflection, transfer from the lower components of the spectrum into the higher components linearly, resulting in change for amplitude distribution of soliton in which the slope of the curve gets larger in deflection direction and smaller for the opposite.

Keywords: nonlinear optics self-deflection perturbation method screening bright soliton alternating electric field

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