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## 非线性光学

### 二维谐振子调制势中光束传输特性研究

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摘要: 运用自相似方法, 求出了二维谐振子调制势下光束的传输方程的精确解析解, 并对光束在传输距离一定时其传输特性随量子数的变化规律进行了数值分析. 结果表明, 在谐振子势调制下, 光束传播的波函数解为厄米特函数, 且在能量峰值上表现出类似于亮孤子的中间能量高于外围能量的特性, 在几何分布上形成矩阵或方阵式波包. 波包总数受 $x$ 、 $y$ 方向的量子数取值影响, 波包能量幅值沿 $x$ 、 $y$ 轴的正负向均逐渐增大且关于矩阵的对角线或 $x$ 、 $y$ 轴对称.

关键词: 非线性光学 谐振子调制 非线性薛定谔方程 厄米特多项式

### Transmission properties of light beams in the potential of two dimensional harmonic oscillator modulation

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Abstract: The analytical solutions of light beams under two-dimensional harmonic oscillator modulation are obtained with self-similar technique, and the change rules with the quantum number of the transmission properties of light beams are discussed by numerical simulation when their transmission distance are taken fixed. It is found that, under two-dimensional harmonic oscillator modulation, the solutions of light beams are Hermite Polynomials, whose energy peaks are the highest in the middle of the wave packet which similar to the bright solitons, and the energy distribution forms a matrix wave packets or a square matrix wave packets in geometry. The total number of wave packets is influenced by the quantum numbers of  $x$  and  $y$  direction. The amplitude of wave packets energy increases gradually along the positive and negative direction of  $x$  and  $y$  axis and is diagonal symmetrical on the matrix,  $x$  axis or  $y$  axis symmetrical.

Keywords: nonlinear optics harmonic oscillator modulation nonlinear Schrodinger equation Hermite polynomial

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