

非线性光学

系统参数对线性耦合物质波孤子演化的影响

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摘要:

运用分步傅里叶方法数值解耦合Gross-Pitaevskii方程, 研究了具有局部畸变的光格势阱中两个线性耦合的玻色-爱因斯坦凝聚孤子的动力学特性。结果表明, 势阱的局部畸变强度和线性耦合系数的大小对两个耦合物质波孤子的交换和自陷效应有重要影响, 线性耦合系数的增加, 物质波孤子间的相互作用从自陷过渡到Josephson振荡。当势阱的局部畸变强度为一些特殊值时, 势阱的局部畸变对物质波孤子的演化影响甚微。

关键词: 量子光学 分步傅里叶方法 物质波孤子 系统参数 线性耦合

Effect of parameters on evolution of the linearly coupling matter-wave solitons

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Abstract:

The dynamical characteristics of two linearly coupling solitons with a localized impurity in Bose-Einstein condensates are investigated by direct numerical simulations of the Gross-Pitaevskii equation with split-step Fourier method. It is found that the evolution of solitons depends on the impurity strength and the linearly coupling parameters of the system, and there exist exchange, self-trapping and Josephson oscillator with the increasing of linearly coupling parameters. The effect of the impurity strength of potential well on the evolution of solitons is little when some given values are taken.

Keywords: quantum optics split-step Fourier method matter-wave soliton parameters of the system linearly coupling

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