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基于计算经典辐射功率的量子偶极-偶极相互作用求解

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Method to Obtain Quantum Dipole-Dipole Interaction by Calculating the Classical Radiation Power

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- 摘要
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全文: PDF (483 KB)　　HTML (1 KB)　　**输出:** BibTeX | EndNote (RIS)　　**背景资料**

摘要 提出了一种通用的严格求解任意微纳结构中2个二能级"原子"间量子偶极-偶极相互作用的方法.量子偶极-偶极相互作用传输率用2个经典电偶极子同时存在时的辐射功率减去它们单独存在时的辐射功率来表达，辐射功率通过经典的时域有限差分方法获得.将该方法应用到偶极子处于真空和平板金属腔中的情况，其数值结果与解析结果符合得很好，验证了该方法的可行性.

关键词:　量子偶极-偶极相互作用　时域有限差分　辐射功率

Abstract: This paper puts forward a general exact approach to obtain the quantum dipole-dipole interaction (DDI) between two two-level "atoms" in arbitrary nanostructures, in which the transfering rate of the DDI is analytically expressed as the difference between the two classical dipoles' total radiation power and the sum of the two individual dipole's radiation powers. The radiation power can be calculated by the finite-difference time-domain method. The validity of the method is tested for dipoles placed in vacuum and in an ideal planar microcavity and the calculated results agree well with the analytic solutions.

Key words:　quantum dipole-dipole interaction　finite difference time domain method　radiation power

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引用本文:

黄勇刚,孙晶,王小云. 基于计算经典辐射功率的量子偶极-偶极相互作用求解[J]. 吉首大学学报自然科学版, 2012, 33(6): 41-46.

HUANG Yong-Gang,SUN Jing,WANG Xiao-Yun. Method to Obtain Quantum Dipole-Dipole Interaction by Calculating the Classical Radiation Power[J]. Journal of Jishou University（ Natural Sciences Edit, 2012, 33(6): 41-46.

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