

量子光学

基于坐标-动量中介表象的热平衡态谐振子密度矩阵

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摘要:

利用了相干态的方法, 并且借助坐标-动量中介表象研究了处于热平衡状态下谐振子的密度矩阵。在此基础上, 可以不必利用傅里叶变换关系, 而是仅仅通过选择不同的参数值, 就可以获得坐标和动量表象下处于热平衡状态下的谐振子密度矩阵的表示式。另外, 本文也给出了直接求解密度矩阵的过程, 发现此结果与厄密多项式密切相关, 作为以上所求表示式的一个有效的应用, 通过比较两种方法的结果, 一个全新的厄密多项式的关系式被揭示出来。

关键词: 量子光学 密度矩 中间表象 厄密多项式

Density matrix of the harmonic oscillator in thermostat based on coordinate-momentum intermediate representation

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Abstract:

The density matrix of the harmonic oscillator in thermostat is calculated by virtue of the coherent states method and the coordinate momentum intermediate representation. On the basis of this, the density matrix of the harmonic oscillator in thermostat is presented only through choosing different parameter values without making use of Fourier-transformation relations and direct calculation. Furthermore, the direct way to calculate the density matrix is also shown and the corresponding result is closely related to Hermite polynomials. As a useful application of the above conclusions, a fully new relation on Hermite polynomials can be revealed by comparing both of the above equivalent results.

Keywords: quantum optics density matrix intermediate representation Hermite polynomial

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