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Dynamics of Jaynes-Cummings Model in the Absence of Rotating-Wave Approximation

FAN Yun-Xia,[1] LIU Tao,[1] FENG Mang,[1,2] and WANG Ke-Lin[1,3]

[1] School of Science, Southwest University of Science and Technology, Mianyang 621010, China
[2] State Key Laboratory of Magnetic Resonance and Atomic and Molecular Physics, Wuhan Institute of Physics and Mathematics, the Chinese Academy of Sciences, Wuhan 430070, China
[3] Department of Modern Physics, University of Science and Technology of China, Hefei 230026, China
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Abstract: The Jaynes-Cummings model (JCM) is studied in the absence of the rotating-wave approximation (RWA) by a coherent-state expansion technique. In comparison with the previous paper in which the coherent-state expansion was performed only to the third order, we carry out in this paper a complete expansion to demonstrate exactly the dynamics of the JCM without the RWA. Our study gives a systematic method to solve the non-RWA problem, which would be useful in various physical systems, e.g., in a system with an ultracold trapped ion experiencing the running waves of lasers.

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