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Quantum entanglement and quantum phase transition under dissipation in the anisoropic Heisenberg xxz model with the Dzyaloshinskii-Moriya interaction

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Abstract
Because the key issue in quantum information and quantum computing is entanglement, the investigation of the effects of environment, as a source of quantum dissipation, and interaction between environment and system on entanglement and quantum phase transition is important. In this paper, we consider two-qubit system in the anisotropic Heisenberg XXZ model with the Dzyaloshinskii-moriya interaction, and accompanied quantum dissipation. Using Lindblad dynamics, the coupling effect and also temperature effect on concurrence, as a measure of entanglement of system, is obtained. The role of DM interaction parameters in the evolution of entanglement is investigated. Furthermore, using derivative of concurrence, the effects of dissipation and DM interaction parameter on quantum phase transition are obtained. It should be noted that spin-orbit interaction or DM parameter intensively influence the process of impressments of dissipation on entanglement measure and quantum phase transition. The current research is very important in the topics of nanometric systems.

Keywords: dissipative quantum theory, quantum entanglement, quantum phase transition

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