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Survival of entanglement in an optical parametric oscillation from decoherence. (English)

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Summary: We consider a parametric oscillation driven by coherent light beams and coupled to a two-mode thermal reservoir. Applying the solutions of the quantum Langevin equations, we investigate the effect of decoherence and the driving coherent light beams on the squeezing and entanglement as well as statistical properties of the two-mode cavity radiation. We show that the two-mode thermal noise and the driving coherent light beams lead to an increase in the intensity of the cavity radiation. However, the driving coherent light beams do not have any effect on the squeezing and entanglement properties of the two-mode cavity radiation while the two-mode thermal noise leads to a decrease in the degree of squeezing and entanglement of the two-mode cavity radiation.

MSC:

81R30 Coherent states
81P40 Quantum coherence, entanglement, quantum correlations
81V80 Quantum optics
81S22 Open systems, reduced dynamics, master equations, decoherence
82C31 Stochastic methods (Fokker-Planck, Langevin, etc.) applied to problems in time-dependent statistical mechanics
81P68 Quantum computation
68Q12 Quantum algorithms and complexity in the theory of computing
78A60 Lasers, masers, optical bistability, nonlinear optics

Keywords:

quadrature squeezing; entanglement; mean of the photon number pairs; decoherence

Full Text: DOI

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