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Dynamics of a degenerate parametric oscillator in a squeezed reservoir. (English)

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Summary: Dynamics of a cavity mode which, in addition to interacting to an outside field with squeezed fluctuations, is simultaneously submitted to linear and parametric amplification processes is discussed in the Markovian approximation. The master equation for a density matrix of the cavity field is solved analytically in the Heisenberg picture. Long time asymptotic properties of the cavity mode are studied in the whole range of the evolution parameters and the corresponding decoherence effects are reported. It is also shown that in an appropriate regime of the evolution parameters there exists a unique steady state such that all initial density matrices evolve towards it. This allows engineering cavity states with desired properties.

MSC:

81R30 Coherent states
81V80 Quantum optics
81Q05 Closed and approximate solutions to the Schrödinger, Dirac, Klein-Gordon and other equations of quantum mechanics
47D06 One-parameter semigroups and linear evolution equations

Keywords:

quantum dynamical semigroups; quantum optics; squeezed states; equilibrium states

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