Nonlinear Sciences > Exactly Solvable and Integrable Systems

Saturation of Stationary Inversion States in a Three-Level Traveling-Wave Quantum Amplifier with Bistable Resonator Pumping

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The inversion states of a saturated traveling-wave three-level quantum paramagnetic amplifier have been investigated under conditions of bistable resonator pumping. The equations of motion for the vectorial order parameter have been obtained using adiabatic elimination of fast variables. The exact solutions for stationary inversion states have been found from these equations. For high-quality pump resonators, the isolated and the semi-isolated branches of the inversion ratio have been revealed in stationary solutions. The existence of the semi-isolated branches means a possibility of collapse of the inversion state under influence of a saturating signal. Revival of inversion is possible in this case only by the hard excitation of the pump system. This nonlinear phenomenon is of a qualitatively another nature than one described by us in arXiv:0901.0449v1 [nlin.AO], and may be observed at moderate Q-factor of pump resonator.

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References & Citations

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