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Dynamic Equations and Nonlinear Dynamics of Cascade Two-Photon Laser

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Abstract: We derive equations and study nonlinear dynamics of cascade two-photon laser, in which the electromagnetic field in the cavity is driven by coherently prepared three-level atoms and classical field injected into the cavity. The dynamic equations of such a system are derived by using the technique of quantum Langevin operators, and then are studied numerically under different driving conditions. The results show that under certain conditions the cascade two-photon laser can generate chaotic, period doubling, periodic, stable and bistable states. Chaos can be inhibited by atomic populations, atomic coherences, and injected classical field. In addition, no chaos occurs in optical bistability.

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