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2.5.1 Description of the Cavity Structure2.5.2 The Modes of the "Universe"; 3 A One-Dimensional Quasimode Laser: General Formulation; 3.1 Cavity Resonant Modes; 3.2 The Atoms; 3.3 The Atom-Field Interaction; 3.4 Equations Governing the Atom-Field Interaction; 3.5 Laser Equation of Motion: Introducing the Langevin Forces; 3.5.1 The Field Decay; 3.5.2 Relaxation in Atomic Dipole and Atomic Inversion; 4 A One-Dimensional Quasimode Laser: Semiclassical and Quantum Analysis; 4.1 Semiclassical Linear Gain Analysis; 4.2 Semiclassical Nonlinear Gain Analysis; 4.3 Quantum Linear Gain Analysis

4.4 Quantum Nonlinear Gain Analysis5 A One-Dimensional Laser with Output Coupling: Derivation of the Laser Equation of Motion; 5.1 The Field; 5.2 The Atoms; 5.3 The Atom-Field Interaction; 5.4 Langevin Forces for the Atoms; 5.5 Laser Equation of Motion for a Laser with Output Coupling; 6 A One-Dimensional Laser with Output Coupling: Contour Integral Method; 6.1 Contour Integral Method: Semiclassical Linear Gain Analysis; 6.2 Contour Integral Method: Semiclassical Nonlinear Gain Analysis; 6.3 Contour Integral Method: Quantum Linear Gain Analysis

6.4 Contour Integral Method: Quantum Nonlinear Gain Analysis7 A One-Dimensional Laser with Output Coupling: Semiclassical Linear Gain Analysis; 7.1 The Field Equation Inside the Cavity; 7.2 Homogeneously Broadened Atoms and Uniform Atomic Inversion; 7.3 Solution of the Laser Equation of Motion; 7.3.1 The Field Equation for Inside the Cavity; 7.3.2 Laplace-Transformed Equations; 7.3.3 The Field Inside the Cavity; 7.3.4 The Field Outside the Cavity; 8 A One-Dimensional Laser with Output Coupling: Semiclassical Nonlinear Gain Analysis; 8.1 The Field Equation Inside the Cavity

8.2 Homogeneously Broadened Atoms and Uniform Pumping

Sommario/riassunto

Authored by one of the founders and major players in this field of research, this is a thorough and comprehensive approach to the quantum mechanical output coupling theory of lasers -- an important area of optical physics that has so far been neglected in the scientific literature. Clearly structured, the various sections cover one-dimensional optical cavity, laser, and microcavity laser with output coupling, atom-field interaction in a free-dimensional space, 3D analysis of spontaneous emission in a planar microcavity with output coupling, plus two-atom spontaneous emission.With numer