1. Record Nr. UNINA9910143747803321

Titolo	Unlocking dynamical diversity [[electronic resource]] : optical feedback effects on semiconductor lasers / / edited by Deborah M. Kane, K. Alan Shore
Pubbl/distr/stampa	Chichester, : John Wiley, c2005
ISBN	1-280-24285-X 9786610242856 0-470-29707-7 0-470-85621-1 0-470-85620-3
Descrizione fisica	1 online resource (357 p.)
Altri autori (Persone)	KaneDeborah M ShoreK. Alan
Disciplina	621.366 621.3661
Soggetti	Semiconductor lasers Optical communications Electronic books.
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Note generali	Description based upon print version of record.
Nota di bibliografia	Includes bibliographical references and index.
Nota di contenuto	UNLOCKING DYNAMICAL DIVERSITY; Contents; List of Contributors; Preface; Acknowledgements; 1 Introduction; 1.1 Semiconductor Laser Basics; 1.1.1 Semiconductor Laser Materials and Output Wavelengths; 1.1.2 Semiconductor Laser Structures; 1.1.3 Semiconductor Laser Gain and Output Power versus Injection Current; 1.1.4 Semiconductor Laser Relaxation Oscillations, Noise, Modulation and Linewidth Enhancement Factor; 1.2 Nonlinear Dynamical Systems; 1.3 Semiconductor Lasers with Optical Feedback; 1.4 Landmark Results: Theory and Experiment; 1.5 Overview of Feedback Response: Regimes I-V 1.6 Outline of ApplicationsReferences; 2 Theoretical Analysis; 2.1 Introduction; 2.2 Basic Model: Single Mode Lasers with Weak Optical Feedback; 2.3 Steady State Analysis of the Lang-Kobayashi Equations; 2.4 Multimode Iterative Analysis of the Dynamics of Laser Diodes Subject to Optical Feedback; 2.4.1 Dynamics of MultiMode Laser

Diodes; 2.4.2 Steady State Solutions; 2.4.3 Comparison with Lang-Kobayashi Rate Equations; 2.5 Cavity Length Effects; 2.5.1 Long External Cavities; 2.5.2 Short External Cavities; 2.6 Coupled Cavity Analysis; 2.6.1 Theory; 2.6.2 Comparison with LK Analysis
2.6.3 Typical Results2.7 Conclusion; References; 3 Generalized Optical Feedback: Theory; 3.1 Varieties of Optical Feedback; 3.2 Compound-Cavity Analysis: Validity of Lang-Kobayashi Approach; 3.3 Filtered Optical Feedback; 3.3.1 External Cavity Modes; 3.3.2 Dynamics; 3.4 Phase-Conjugate Feedback; 3.4.1 Steady State; 3.4.2 Results of Stability Analysis for the Steady State; 3.4.3 High-Frequency Oscillations; 3.5 Conclusion; Acknowledgements; Note; References; 4 Experimental Observations; 4.1 Introduction; 4.2 Experimental Apparatus; 4.3 Extremely Weak Feedback Effects - Regime I
4.4 Very Weak Feedback Effects - Regime II4.5 Weak Feedback Effects - Regime III-IV; 4.6 Moderate Feedback Effects - Low Frequency Fluctuations; 4.7 Short Cavity Regime; 4.8 Double-Cavity Systems; 4.9 Multimode Effects; 4.10 Control; 4.11 Feedback and Modulation; 4.12 Phase Conjugate Feedback; 4.13 Conclusion; References; 5 Bifurcation Analysis of Lasers with Delay; 5.1 Introduction; 5.2 Bifurcation Theory of DDEs; 5.2.1 The Phase Space of a DDE; 5.2.2 Local Bifurcations of Steady States; 5.2.3 Local Bifurcations of Periodic Orbits; 5.2.4 Unstable Manifolds and Global Bifurcations
5.3 Numerical Methods5.3.1 Simulation by Direct Numerical Integration; 5.3.2 Numerical Continuation; 5.3.3 Computation of 1D Unstable Manifolds; 5.4 Bifurcations in the COF Laser; 5.4.1 Symmetry of the COF Laser Equation; 5.4.2 External Cavity Modes; 5.4.3 The Characteristic Equation of an ECM; 5.4.4 Continuation Near Connecting Bridges; 5.4.5 Global Bifurcations of ECMs; 5.5 Bifurcations in the PCF Laser; 5.5.1 Symmetry of the PCF Laser Equation; 5.5.2 Bifurcation Diagram Near the Locking Region; 5.5.3 Bifurcations of ECMs; 5.5.4 Break-up of a Torus and Crisis Bifurcation; 5.6 Conclusion
Acknowledgements

Sommario/riassunto

Applications of semiconductor lasers with optical feedback systems are driving rapid developments in theoretical and experimental research. The very broad wavelength-gain-bandwidth of semiconductor lasers combined with frequency-filtered, strong optical feedback create the tunable, single frequency laser systems utilised in telecommunications, environmental sensing, measurement and control. Those with weak to moderate optical feedback lead to the chaotic semiconductor lasers of private communication. This resource illustrates the diversity of dynamic laser states and the technological applicat