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Nota di contenuto	LIGHTWAVE TECHNOLOGY; Contents; Preface; 1 Introduction; 1.1 Evolution of Lightwave Systems; 1.2 Components of a Lightwave System; 1.2.1 Optical Transmitters; 1.2.2 Communication Channel; 1.2.3 Optical Receivers; 1.3 Electrical Signals; 1.3.1 Analog and Digital Signals; 1.3.2 Advantages of Digital Format; 1.3.3 Analog to Digital Conversion; 1.4 Channel Multiplexing; 1.4.1 Time-Division Multiplexing; 1.4.2 Frequency-Division Multiplexing; 1.4.3 Code-Division Multiplexing; Problems; References; 2 Optical Signal Generation; 2.1 Modulation Formats; 2.1.1 ASK Format; 2.1.2 PSK Format 2.1.3 FSK Format2.2 Digital Data Formats; 2.2.1 Nonreturn-to-Zero Format; 2.2.2 Return-to-Zero Format; 2.2.3 Power Spectral Density; 2.3 Bit-Stream Generation; 2.3.1 NRZ Transmitters; 2.3.2 RZ Transmitters; 2.3.3 Modified RZ Transmitters; 2.3.4 DPSK Transmitters and Receivers;

2.4 Transmitter Design; 2.4.1 Coupling Losses and Output Stability; 2.4.2 Wavelength Stability and Tunability; 2.4.3 Monolithic Integration; 2.4.4 Reliability and Packaging; Problems; References; 3 Signal Propagation in Fibers; 3.1 Basic Propagation Equation; 3.2 Impact of Fiber Losses; 3.2.1 Loss Compensation 3.2.2 Lumped and Distributed Amplification 3.3 Impact of Fiber Dispersion; 3.3.1 Chirped Gaussian Pulses; 3.3.2 Pulses of Arbitrary Shape; 3.3.3 Effects of Source Spectrum; 3.3.4 Limitations on the Bit Rate; 3.3.5 Dispersion compensation; 3.4 Polarization-Mode Dispersion; 3.4.1 Fibers with Constant Birefringence; 3.4.2 Fibers with Random Birefringence; 3.4.3 Jones-Matrix Formalism; 3.4.4 Stokes-Space Description; 3.4.5 Statistics of PMD; 3.4.6 PMD-Induced Pulse Broadening; 3.4.7 Higher-Order PMD Effects; 3.5 Polarization-Dependent Losses; 3.5.1 PDL Vector and Its Statistics 3.5.2 PDL-Induced Pulse Distortion Problems; References; 4 Nonlinear Impairments; 4.1 Self-Phase Modulation; 4.1.1 Nonlinear Phase Shift; 4.1.2 Spectral Broadening and Narrowing; 4.1.3 Effects of Fiber Dispersion; 4.1.4 Modulation Instability; 4.2 Cross-Phase Modulation; 4.2.1 XPM-Induced Phase Shift; 4.2.2 Effects of Group-Velocity Mismatch; 4.2.3 Effects of Group-Velocity Dispersion; 4.2.4 Control of XPM Interaction; 4.3 Four-Wave Mixing; 4.3.1 FWM Efficiency; 4.3.2 Control of FWM; 4.4 Stimulated Raman Scattering; 4.4.1 Raman-Gain Spectrum; 4.4.2 Raman Threshold 4.5 Stimulated Brillouin Scattering 4.5.1 Brillouin Threshold; 4.5.2 Control of SBS; 4.6 Nonlinear Pulse Propagation; 4.6.1 Moment Method; 4.6.2 Variational Method; 4.6.3 Specific Analytic Solutions; 4.7 Polarization Effects; 4.7.1 Vector NLS equation; 4.7.2 Manakov Equation; Problems; References; 5 Signal Recovery and Noise; 5.1 Noise Sources; 5.1.1 Shot Noise; 5.1.2 Thermal Noise; 5.2 Signal-to-Noise Ratio; 5.2.1 Receivers with a p-i-n Photodiode; 5.2.2 APD Receivers; 5.3 Receiver Sensitivity; 5.3.1 Bit-Error Rate; 5.3.2 Minimum Average Power; 5.3.3 Quantum Limit of Photodetection 5.4 Sensitivity Degradation

Sommario/riassunto

The state of the art of modern lightwave system design Recent advances in lightwave technology have led to an explosion of high-speed global information systems throughout the world. Responding to the growth of this exciting new technology, Lightwave Technology provides a comprehensive and up-to-date account of the underlying theory, development, operation, and management of these systems from the perspective of both physics and engineering. The first independent volume of this two-volume set, Components and Devices, deals with the multitude of silica- and semiconductor-based opt

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