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3.2.3 Noise Model; 3.3 Quantum-Well Lasers; 3.3.1 One-Level Equivalent Circuit Model; 3.3.2 Two-Level Equivalent Circuit Model; 3.3.3 Three-Level Equivalent Circuit Model; 3.4 Parameter Extraction Methods; 3.4.1 Direct-Extraction Method; 3.4.2 Semi-Analytical Method; 3.5 Summary; References; 4 Microwave Modeling Techniques of Photodiodes; 4.1 Introduction; 4.2 Physical Principles; 4.3 Figures of Merit; 4.3.1 Responsivity; 4.3.2 Quantum Efficiency; 4.3.3 Absorption Coefficient; 4.3.4 Dark Current; 4.3.5 Rise Time and Bandwidth; 4.3.6 Noise Currents; 4.4 Microwave Modeling Techniques; 4.4.1 PIN PD; 4.4.2 APD; 4.5 Summary; References; 5 High-Speed Electronic Semiconductor Devices; 5.1 Overview of Microwave Transistors; 5.2 FET Modeling Technique; 5.2.1 FET Small-Signal Modeling; 5.2.2 FET Large-Signal Modeling; 5.2.3 FET Noise Modeling; 5.3 GaAs/InP HBT Modeling Technique; 5.3.1 GaAs/InP HBT Nonlinear Model; 5.3.2 GaAs/InP HBT Linear Model; 5.3.3 GaAs/InP HBT Noise Model; 5.3.4 Parameter Extraction Methods; 5.4 SiGe HBT Modeling Technique; 5.5 MOSFET Modeling Technique; 5.5.1 MOSFET Small-Signal Model; 5.5.2 MOSFET Noise Model; 5.5.3 Parameter Extraction Methods; 5.6 Summary; References; 6 Semiconductor Laser and Modulator Driver Circuit Design; 6.1 Basic Concepts; 6.1.1 NRZ and RZ Data; 6.1.2 Optical Modulation; 6.1.3 Optical External Modulator; 6.2 Optoelectronic Integration Technology; 6.2.1 Monolithic Optoelectronic Integrated Circuits; 6.2.2 Hybrid Optoelectronic Integrated Circuits; 6.3 Laser Driver Circuit Design; 6.4 Modulator Driver Circuit Design; 6.4.1 FET-Based Driver Circuit; 6.4.2 Bipolar Transistor-Based Driver Integrated Circuit; 6.4.3 MOSFET-Based Driver Integrated Circuit; 6.5 Distributed Driver Circuit Design; 6.6 Passive Peaking Techniques; 6.6.1 Capacitive Peaking Techniques

Sommario/riassunto

In Optoelectronic Integrated Circuit Design and Device Modeling, Professor Jianjun Gao introduces the fundamentals and modeling techniques of optoelectronic devices used in high-speed optical transmission systems. Gao covers electronic circuit elements such as FET, HBT, MOSFET, as well as design techniques for advanced optical transmitter and receiver front-end circuits. The book includes an overview of optical communication systems and computer-aided optoelectronic IC design before going over the basic concept of laser diodes. This is followed by modeling and parameter extraction techn
