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and Plane Waves; 3.3 Far-Field Region; 3.4 Antenna Analysis; 3.5 Antenna Characteristics and Parameters; 3.6 Monopole and Dipole Antennas; 3.7 Horn Antennas; 3.8 Parabolic Dish Antennas; 3.9 Microstrip Patch Antennas; 3.10 Antenna Arrays and Phased Arrays; 3.11 Antenna Measurements; Problems; References; 4 Various Components and Their System Parameters; 4.1 Introduction and History; 4.2 Couplers, Hybrids, and Power Dividers/Combiners; 4.3 Resonators, Filters, and Multiplexers; 4.4 Isolators and Circulators; 4.5 Detectors and Mixers; 4.6 Switches, Phase Shifters, and Attenuators; 4.7 Oscillators and Amplifiers; 4.8 Frequency Multipliers and Dividers; Problems; References; 5 Receiver System Parameters; 5.1 Typical Receivers; 5.2 System Considerations; 5.3 Natural Sources of Receiver Noise; 5.4 Receiver Noise Figure and Equivalent Noise Temperature; 5.5 Compression Points, Minimum Detectable Signal, and Dynamic Range; 5.6 Third-Order Intercept Point and Intermodulation; 5.7 Spurious Responses; 5.8 Spurious-Free Dynamic Range; Problems; References; 6 Transmitter and Oscillator Systems; 6.1 Transmitter Parameters; 6.2 Transmitter Noise; 6.3 Frequency Stability and Spurious Signals; 6.4 Frequency Tuning, Output Power, and Efficiency; 6.5 Intermodulation; 6.6 Crystal Reference Oscillators; 6.7 Phase-Locked Oscillators; 6.8 Frequency Synthesizers; Problems; References; 7 Radar and Sensor Systems; 7.1 Introduction and Classifications; 7.2 Radar Equation; 7.3 Radar Equation Including Pulse Integration and System Losses; 7.4 Radar Cross Section; 7.5 Pulse Radar; 7.6 Continuous-Wave or Doppler Radar; 7.7 Frequency-Modulated Continuous-Wave Radar; 7.8 Direction Finding and Tracking; 7.9 Moving-Target Indication and Pulse Doppler Radar; 7.10 Synthetic Aperture Radar; 7.11 Practical Radar Examples; Problems; References; 8 Wireless Communication Systems; 8.1 Introduction; 8.2 Friis Transmission Equation; 8.3 Space Loss; 8.4 Link Equation and Link Budget; 8.5 Effective Isotropic Radiated Power and G/T Parameters; 8.6 Radio/Microwave Links; 8.7 Satellite Communication Systems; 8.8 Mobile Communication Systems and Wireless Cellular Phones; 8.9 Personal Communication Systems and Satellite Personal Communication Systems

## Sommario/riassunto

A comprehensive introduction to the hardware, parameters, and architectures of RF/microwave wireless systems. As the basis for some of the hottest technologies of the new millennium, radio frequency (RF) and microwave wireless systems rapidly propel us toward a future in which the transmission of voice, video, and data communications will be possible anywhere in the world through the use of simple, handheld devices. This book provides scientists and engineers with clear, thorough, up-to-date explanations of all aspects of RF and microwave wireless systems, including general hardware