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Nota di contenuto	Preface. -- Introduction. -- 1 Fundamentals of Electromagnetics. -- 1.1 RF and Microwave Frequency Ranges. -- 1.2 Fields. -- 1.3 Electromagnetics. -- 1.4 RF and Microwave Energy. -- 1.5 Penetration in Biological Tissues and Skin Effect. -- 1.6 Relaxation, Resonance, and Display. -- -- 1.7 Dielectric Measurements. -- 1.8 Exposure. -- References. -- Problems. -- 2 RF/Microwave Interaction Mechanisms in Biological Materials. -- 2.1 Bioelectricity. -- 2.2 Tissue Characterization. -- 2.3 Thermodynamics. -- 2.4 Energy. -- References. -- Problems. -- 3 Biological Effects. -- 3.1 Absorption. -- 3.2 Nervous System. -- 3.3 Cells and Membranes. -- 3.4 Molecular Level. -- 3.5 Low-Level Exposure and ELF Components. -- 3.6 Ear, Eye,

and Heart. -- 3.7 Influence of Drugs. -- 3.8 Nonthermal, Microthermal, and Isothermal Effects. -- 3.9 Epidemiology Studies. -- 3.10 Interferences. -- 3.11 Radiation Hazards and Exposure Standards. -- References. -- Problems 150 -- 4 Thermal Therapy. -- 4.1 Introduction to Thermotherapy. -- 4.2 Heating Principle. -- 4.3 Hyperthermia. -- 4.4 Method of Thermometry. -- References. -- Problems. -- 5 EM Wave Absorbers Protecting Biological and Medical Environment. -- 5.1 Foundation of EM Wave Absorbers. -- 5.2 Classification of Wave Absorbers. -- 5.3 Fundamental Principle. -- 5.4 Fundamental Theory of EM Wave Absorbers. -- 5.5 Application of EM Absorber. -- 5.6 EM Wave Absorbers Based on Equivalent Transformation Method of Material Constant. -- 5.7 Method for Improving RF Field Distribution in a Small Room. -- References. -- Problems. -- 6 RF/Microwave Delivery Systems for Therapeutic Applications. -- 6.1 Introduction. -- 6.2 Transmission Lines and Waveguides for Medical Applications. -- 6.3 Antennas. -- 6.4 RF and Microwave Ablation. -- 6.5 Perfusion Chamber. -- 6.6 RF Gastroesophageal Reflux Disease. -- 6.7 Endometrial Ablation. -- 6.8 Microwave Measurement Techniques: Examples. -- 6.9 Future Research. -- References. -- Problems. -- Index.

Sommario/riassunto

From engineering fundamentals to cutting-edge clinical applications This book examines the biological effects of RF/microwaves and their medical applications. Readers will discover new developments in therapeutic applications in such areas as cardiology, urology, surgery, ophthalmology, and oncology. The authors also present developing applications in such areas as cancer detection and organ imaging. Focusing on frequency ranges from 100 kHz to 10 GHz, RF/Microwave Interaction with Biological Tissues is divided into six chapters: * Fundamentals in Electromagnetics--examines penetration of RF/microwaves into biological tissues; skin effect; relaxation effects in materials and the Cole-Cole model (display); the near field of an antenna; blackbody radiation and the various associated laws; and microwave measurements. * RF/Microwave Interaction Mechanisms in Biological Materials--includes a section devoted to the fundamentals of thermodynamics and a discussion on energy and entropy. * Biological Effects--investigates the effects of radio frequency fields on the nervous system, the brain and spinal cord, the blood-brain barrier, and cells and membranes. * Thermal Therapy--includes a description of applicators and an extensive discussion on the foundation of dielectric heating and inductive heating. * EM-Wave Absorbers Protecting the Biological and Medical Environment--investigates materials for EM-wave absorbers from both a theoretical and applications perspective. Special attention is given to ferrite absorbers. * RF/Microwave Delivery Systems for Therapeutic Applications--begins with the fundamental features of major components used in RF/microwave delivery systems for therapeutic applications. New research towards the development of future measurement techniques is also presented. The book features problem sets at the end of each chapter, making it an excellent introduction for bioengineering and engineering students. Researchers, physicians, and technicians in the field will also find this an excellent reference that offers all the fundamentals, the most cutting-edge applications, and insight into future developments. An Instructor's Manual presenting detailed solutions to all the problems in the book is available from the Wiley editorial department.