

Interactions Between  
Electromagnetic Fields  
and Cells (Applications  
of Communications  
Theory)

Chiabrera

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**Interactions Between Electromagnetic Fields and Cells-A. Chiabrera**  
1985-12

**Semiconductor Optics and Transport Phenomena-Wilfried Schäfer**  
2013-06-29 Well-balanced and up-to-date introduction to the field of semiconductor optics, including transport phenomena in semiconductors. Starting with the theoretical fundamentals of this field the book develops, assuming a basic knowledge of solid-state physics. The application areas of the theory covered include semiconductor lasers, detectors, electro-optic modulators, single-electron transistors, microcavities and double-barrier resonant tunneling diodes. One hundred problems with hints for solution help the readers to deepen their knowledge.

**Human Interaction with Electromagnetic Fields-Dragan Poljak**  
2019-06-07 Human Interaction with Electromagnetic Fields: Computational Models in Dosimetry presents some highly rigorous and sophisticated integral equation techniques from computational electromagnetics (CEM), along with practical techniques for the calculation and measurement of internal dosimetry. Theory is accompanied by numerical modeling algorithms and illustrative computational examples that range from academic to full real-world scenarios. Covers both deterministic and stochastic modeling Presents implementations of integral equation approaches, overcoming the limitations of the FDTD approach Presents various biomedical applications

**Principles and Applications of RF/Microwave in Healthcare and Biosensing-Changzhi Li** 2016-10-05 This reference, written by leading authorities in the field, gives basic theory, implementation details, advanced research, and applications of RF and microwave in healthcare and biosensing. It first provides a solid understanding of the fundamentals with coverage of the basics of microwave engineering and the interaction between electromagnetic waves and biomaterials. It then presents the state-of-the-art development in microwave biosensing, implantable devices - including applications of microwave technology for sensing biological tissues - and medical diagnosis, along with applications involving remote patient monitoring. This book is an ideal reference for RF and microwave engineer working on, or thinking of working on, the applications of RF and Microwave technology in medicine and biology. Learn: The fundamentals of RF and microwave engineering in healthcare and biosensing How to combine biological and medical aspects of the field with underlying engineering concepts How to implement microwave biosensing for material characterization and cancer diagnosis Applications and functioning of wireless implantable biomedical devices and microwave non-contact biomedical radars How to combine devices, systems, and methods for new practical applications The first book to review the fundamentals, latest developments, and future trends in this important emerging field with emphasis on engineering aspects of sensing, monitoring, and diagnosis using RF and Microwave Extensive coverage of biosensing applications are included Written by leaders in the field, including members of the Technical Coordinating Committee of the Biological Effects and Medical Applications of the IEEE Microwave Theory and Techniques Society

**Electromagnetic Fields in Biological Systems-James C. Lin** 2016-04-19 Spanning static fields to terahertz waves, this volume explores the range of consequences electromagnetic fields have on the human body. Topics discussed include essential interactions and field coupling phenomena; electric field interactions in cells, focusing on ultrashort, pulsed high-intensity fields; dosimetry or coupling of ELF fields into biological systems;

and the historical developments and recent trends in numerical dosimetry. It also discusses mobile communication devices and the dosimetry of RF radiation into the human body, exposure and dosimetry associated with MRI and spectroscopy, and available data on the interaction of terahertz radiation with biological tissues, cells, organelles, and molecules.

**Mechanistic Approaches to Interactions of Electric and Electromagnetic Fields with Living Systems-Martin Blank** 2013-11-11 Although there is general agreement that exogenous electric and electromagnetic fields influence and modulate the properties of biological systems, there is no consensus regarding the mechanisms by which such fields operate. It is the purpose of this volume to bring together and examine critically the mechanistic models and concepts that have been proposed. We have chosen to arrange the papers in terms of the level of biological organization emphasized by the contributors. Some papers overlap categories, but the progression from ions and membrane surfaces, through macromolecules and the membrane matrix to integrated systems, establishes a mechanistic chain of causality that links the basic interactions in the relatively well understood simple systems to the complex living systems, where all effects occur simultaneously. The backgrounds of the invited contributors include biochemistry, biophysics, cell biology, electrical engineering, electrochemistry, electrophysiology, medicine and physical chemistry. As a result of this diversity, the mechanistic models reflect the differing approaches used by these disciplines to explain the same phenomena. Areas of agreement define the common ground, while the areas of divergence provide opportunities for refining our ideas through further experimentation. To facilitate the interaction between the different points of view, the authors have clearly indicated those published observations that they are trying to explain, i.e. the experiments that have been critical in their thinking. This should establish a consensus regarding important observations. In the discussion of theories.

**Bioelectromagnetics Current Concepts-Sinerik N. Ayrapetyan**  
2006-01-12 Proceedings of the NATO Advanced Research Workshop on The Mechanisms of the Biological Effect on Extra High Power Pulses (EHPP), Yerevan, Armenia 3 - 5 March 2005

**Human Exposure to Electromagnetic Fields-Patrick Staebler**  
2017-05-12 Everyone, whether they like it or not, is exposed to electromagnetic fields, most of the time, at very low levels. In this case, they are inconsequential, but they can cause adverse health effects when they become intense enough. This topic is complex and sensitive. Covering frequencies from 0 Hz to 300 GHz, Human Exposure to Electromagnetic Fields provides an overview of this vast topic. After a reminder of the concepts of electromagnetic fields, the author presents some examples of sources of radiation in daily life and in the industrial or medical sectors. The biophysical and biological effects of these fields on the human body are detailed and the exposure limits are recalled. The exposure assessment and the implementation of the appropriate regulation within companies are also covered. Technically and practically, this book is aimed at people with a scientific background, risk prevention actors, health physicians, especially occupational doctors, and equipment designers.

**Interactions Between Electromagnetic Fields and Matter-Karl-Heinz Steiner** 1973

**Assessment of the Possible Health Effects of Ground Wave Emergency Network-National Research Council** 1993-02-01 Written at the request of the U.S. Air Force and Congress, this book evaluates the potential health effects associated with deployment of the Ground Wave

Emergency Network (GWEN), a communications system to be used in case of a high-altitude detonation of a nuclear device. The committee, composed of experts in biophysics, physics, risk assessment, epidemiology, and cancer, examines data from laboratory and epidemiologic studies of effects from electromagnetic fields to determine the likelihood of health effects being caused by the operation of a fully implemented GWEN system.

**Electromagnetic Field Interaction with Transmission Lines**-Farhad Rachidi 2008 The evaluation of electromagnetic field coupling to transmission lines is an important problem in electromagnetic compatibility. Traditionally, use is made of the TL approximation which applies to uniform transmission lines with electrically small cross-sectional dimensions, where the dominant mode of propagation is TEM. Antenna-mode currents and higher-order modes appearing at higher frequencies are neglected in TL theory. The use of the TL approximation has permitted to solve a large range of problems (e.g. lightning and EMP interaction with power lines). However, the continual increase in operating frequency of products and higher frequency sources of disturbances (such as UWB systems) makes that the TL basic assumptions are no longer acceptable for a certain number of applications. In the last decade or so, the generalization of classical TL theory to take into account high frequency effects has emerged as an important topic of study in electromagnetic compatibility. This effort resulted in the elaboration of the so-called 'generalized' or 'full-wave' TL theory, which incorporates high frequency radiation effects, while keeping the relative simplicity of TL equations. This book is organized in two main parts. Part I presents consolidated knowledge of classical transmission line theory and different field-to-transmission line coupling models. Part II presents different approaches developed to generalize TL Theory.

**Biological Effects of Electromagnetic Fields**-Peter Stavroulakis 2013-03-09 Reporting new results, this book covers the subject of biological effects of EMF in its entirety. Experimental verification of the theoretical results is given when at all possible, and the book is expected to open new areas of research, providing material for university course creation.

**Applied Electromagnetism and Materials**-André Moliton 2007-03-14 This book presents practical and relevant technological information about electromagnetic properties of materials and their applications. It is aimed at senior undergraduate and graduate students in materials science and is the product of many years of teaching basic and applied electromagnetism. Topics range from the spectroscopy and characterization of dielectrics, to non-linear effects, to ion-beam applications in materials.

**Electromagnetic Fields in Biology and Medicine**-Marko S. Markov 2015-03-02 Through a biophysical approach, Electromagnetic Fields in Biology and Medicine provides state-of-the-art knowledge on both the biological and therapeutic effects of Electromagnetic Fields (EMFs). The reader is guided through explanations of general problems related to the benefits and hazards of EMFs, step-by-step engineering processes, and basic results obtained from laboratory and clinical trials. Basic biological mechanisms reviewed by several authors lead to an understanding of the effects of EMFs on microcirculation as well as on immune and anti-inflammatory responses. Based upon investigational mechanisms for achieving potential health benefits, various EMF medical applications used around the world are presented. These include the frequent use of EMFs in wound healing and cartilage/bone repair as well as use of EMFs in pain control and inhibition of cancer growth. Final chapters cover the potential of using the novel biophysical methods of electroporation and nanoelectroporation in electrochemotherapy, gene therapy, and nonthermal ablation. Also covered is the treatment of tendon injuries in animals and humans. This book is an invaluable tool for scientists, clinicians, and medical and engineering students.

**Biological Effects and Dosimetry of Nonionizing Radiation**-Martino Gandolfo 2013-11-11 During the last 35 years, there has been considerable development and increase in the number of devices that emit nonionizing radiant energies. These energies such as radiofrequency including microwaves are used in all sectors of our society for military, industrial, telecommunications, medical, and consumer applications. This increase in sources of nonionizing radiant energies has resulted in growing interest on the part of government regulatory agencies, industrial and military physicians, research workers, clinicians, and environmentalists. Although there is information on biologic effects and potential hazards to man from exposure to microwave/radiofrequency energies, considerable confusion and misinformation has permeated not only the public press but also some scientific and technical publications. Because of the complexity of the interactions of nonionizing radiation in biological systems, an inter-

disciplinary approach is necessary to assess and elucidate the problems that evolve as this field advances and as the use of these energies expands. It is important to maintain a proper perspective and assess realistically the biomedical effects of these radiant energies so that the worker or general public will not be unduly exposed nor will research, development and beneficial utilization of these energies be hampered or restricted by an undue concern for effects which may be nonexistent or minimal in comparison to other environmental hazards.

**Electromagnetic Fields**-Martin Blank 1995 Thus, epidemiological studies suggest that children living near electric power lines have an increased risk of leukemia, and clinical studies show that low-energy, pulsed EMFs accelerate healing of bone fractures. The mechanisms underlying these effects are not yet understood, but in vitro studies show that low-energy EMFs induce changes in protein syntheses that are similar to the stress response found normally in all cells. This 26-chapter book provides a comprehensive survey of the multifaceted issues raised by environmental EMFs by looking at physical and biological fundamentals of EMFs, health risks and benefits of exposure, and biophysical and biochemical mechanisms of interaction.

**Evaluation of the Potential Carcinogenicity of Electromagnetic Fields**- 1990

**Integrative Biophysics**-Fritz-Albert Popp 2013-03-09 Most of the specialists working in this interdisciplinary field of physics, biology, biophysics and medicine are associated with "The International Institute of Biophysics" (IIB), in Neuss, Germany, where basic research and possibilities for applications are coordinated. The growth in this field is indicated by the increase in financial support, interest from the scientific community and frequency of publications. Audience: The scientists of IIB have presented the most essential background and applications of biophotonics in these lecture notes in biophysics, based on the summer school lectures by this group. This book is devoted to questions of elementary biophysics, as well as current developments and applications. It will be of interest to graduate and postgraduate students, life scientists, and the responsible officials of industries and governments looking for non-invasive methods of investigating biological tissues.

**Multiple Scattering of Light by Particles**-Michael I. Mishchenko 2006 Monograph on multiple scattering of light by small particles; resource for science professionals, engineers, and graduate students.

**Quantum Field Theory**-Roberto Iengo 2018-07-10 While there are many good books in particle physics, very seldom if ever a non-specialist comprehensive description of Quantum Field Theory has appeared. The intention of this short book is to offer a guided tour of that innermost topic of Theoretical Physics, in plain words and avoiding the mathematical apparatus, but still describing its various facets up to the research frontier, with the aim to give a glimpse of what the human mind has been capable of imagining for dealing with the behavior of Nature at the most fundamental level.

**Plasma Physics of the Local Cosmos**-National Research Council 2004-05-06 Solar and space physics is the study of solar system phenomena that occur in the plasma state. Examples include sunspots, the solar wind, planetary magnetospheres, radiation belts, and the aurora. While each is a distinct phenomenon, there are commonalities among them. To help define and systematize these universal aspects of the field of space physics, the National Research Council was asked by NASA's Office of Space Science to provide a scientific assessment and strategy for the study of magnetized plasmas in the solar system. This report presents that assessment. It covers a number of important research goals for solar and space physics. The report is complementary to the NRC report, *The Sun to the Earth and Beyond: A Decadal Research Strategy for Solar and Space Physics*, which presents priorities and strategies for future program activities.

**Propagation of Electromagnetic Waves in a Plasma (ionosphere)**-V. N. Gershman 1962

**Biological Effects of Electromagnetic Waves**-Curtis C. Johnson 1977

**Biological Effects and Dosimetry of Static and ELF Electromagnetic**

**Fields**-Martino Gandolfo 2013-03-09 The editors are pleased to present these Proceedings of the V Course of the "International School of Radiation Damage and Protection" of the "E. Majorana Centre", held in Erice (Italy) in November 1983. The lectures and discussions among leading scientists in various disciplines of physics, engineering, biophysics, cellular biology, physiology and medicine from 11 countries are included in this compilation. In this volume we have attempted to explore all aspects of the interaction of static and Extremely Low Frequency (ELF: 0-300 Hz) electric and magnetic fields with biological tissue, systems and whole organisms; we considered dosimetry and what is known or presumed concerning basic interactions, responses from the cellular and molecular level to the whole organism. Discussions of medical applications as well as epidemiologic investigations related to high voltage transmission were held with critiques of methodologies used and recommendations for future approaches. Consideration was also given to the necessity and principles of setting protection standards for man and the environment. We believe this is the first attempt to put all this information together into one volume to provide perspective for understanding the influence of static and ELF electric and magnetic fields on biological systems. We hope our attempts were successful. Martino Gandolfo Sol M. Michaelson Alessandro Rindi v  
**ACKNOWLEDGEMENTS** This is the Fifth Course of the International School of Radiation Damage and Protection of the "Ettore Majorana" Centre for Scientific Culture directed by Professor A. Zichichi.

**On the Nature of Electromagnetic Field Interactions with Biological Systems**-Allan H. Frey 1994 Presents recent advances in research on the interactions of electromagnetic fields (EMF) with biological systems. The book discusses the aspects and effects of various electromagnetic fields, as well as the reaction of brain receptor systems to electromagnetic field exposure.

**Molecules in Electromagnetic Fields**-Roman V. Krems 2018-05-21 A tutorial for calculating the response of molecules to electric and magnetic fields with examples from research in ultracold physics, controlled chemistry, and molecular collisions in fields. *Molecules in Electromagnetic Fields* is intended to serve as a tutorial for students beginning research, theoretical or experimental, in an area related to molecular physics. The author—a noted expert in the field—offers a systematic discussion of the effects of static and dynamic electric and magnetic fields on the rotational, fine, and hyperfine structure of molecules. The book illustrates how the concepts developed in ultracold physics research have led to what may be the beginning of controlled chemistry in the fully quantum regime. Offering a glimpse of the current state of the art research, this book suggests future research avenues for ultracold chemistry. The text describes theories needed to understand recent exciting developments in the research on trapping molecules, guiding molecular beams, laser control of molecular rotations, and external field control of microscopic intermolecular interactions. In addition, the author presents the description of scattering theory for molecules in electromagnetic fields and offers practical advice for students working on various aspects of molecular interactions. This important text: Offers information on the effects of electromagnetic fields on the structure of molecular energy levels Includes thorough descriptions of the most useful theories for ultracold molecule researchers Presents a wealth of illustrative examples from recent experimental and theoretical work Contains helpful exercises that help to reinforce concepts presented throughout text Written for senior undergraduate and graduate students, professors, researchers, physicists, physical chemists, and chemical physicists, *Molecules in Electromagnetic Fields* is an interdisciplinary text describing theories and examples from the core of contemporary molecular physics.

**Genotoxicity**-Marcelo Larramendy 2018-07-11 This book is designed to provide an overview of the different genotoxicants and their effects on living organisms, including humans. The contributions made by the specialists in this field of research are gratefully acknowledged. We hope that the information presented in this book will meet the expectations and needs of all those interested in the different aspects of the genotoxicity field. The publication of this book is of great importance to those scientists, pharmacologists, physicians and veterinarians, as well as engineers, teachers, graduate students and administrators of environmental programmes, who make use of these investigations to understand both the basic and applied genotoxic aspects of known and new xenobiotics, and to guide them in their future investigations.

**Electromagnetic Interactions**-Slobodan Danko Bosanac 2016-07-20 This book is devoted to theoretical methods used in the extreme circumstances of very strong electromagnetic fields. The development of high power lasers, ultrafast processes, manipulation of electromagnetic fields and the

use of very fast charged particles interacting with other charges requires an adequate theoretical description. Because of the very strong electromagnetic field, traditional theoretical approaches, which have primarily a perturbative character, have to be replaced by descriptions going beyond them. In the book an extension of the semi-classical radiation theory and classical dynamics for particles is performed to analyze single charged atoms and dipoles submitted to electromagnetic pulses. Special attention is given to the important problem of field reaction and controlling dynamics of charges by an electromagnetic field.

**Electromagnetic Fields and Life**-A. Presman 2013-06-29 A broad region of the electromagnetic spectrum long assumed to have no influence on living systems under natural conditions has been critically re-examined over the past decade. This spectral region extends from the superhigh radio frequencies, through decreasing frequencies, to and including essentially static electric and magnetic fields. The author of this monograph, A. S. Presman, has reviewed not only the extensive Russian literature, but also almost equally comprehensively the non-Russian literature, dealing with biological influences of these fields. Treated also is literature shedding some light on possible theoretical foundations for these phenomena. A substantial, rapidly increasing number of studies in many laboratories and countries has now clearly established biological influences which are independent of the theoretically predictable, simple thermal effects. Indeed many of the effects are produced by field strengths very close to those within the natural environment. The author has, even more importantly, set forth a novel, imaginative general hypothesis in which it is postulated that such electromagnetic fields normally serve as conveyors of information from the environment to the organism, within the organism, and among organisms. He postulates that in the course of evolution organisms have come to employ these fields in conjunction with the well-known sensory, nervous, and endocrine systems in effecting coordination and integration.

**Dielectric Properties of Wood and Wood-Based Materials**-Grigoriy I. Torgovnikov 2012-12-06 Provided here is a comprehensive treatise on all aspects of dielectric properties of wood and wood products. The topics covered include: Interaction between electromagnetic field and wood. - Wood composition and dielectric properties of its components. - Measurement of dielectric parameters of wood.- Dielectric properties of oven-dry wood. - Dielectric properties of moist wood. - Effect of different kinds of treatment on dielectric properties of wood. - Dielectric properties of bark. - Dielectric properties of wood-based materials. - Recommendations for determination of dielectric parameters of wood based materials and for their use in calculations. Several appendices comprise reference data on the dielectric characteristics of wood and wood-based materials in the wide range of frequencies, temperatures, and moisture content.

**Electricity and Magnetism in Biology and Medicine**-Ferdinando Bersani 2012-12-06 This book, a selection of the papers presented at the 2nd World Congress for Electricity and Magnetism, provides state-of-the-art information on applications of electricity and electromagnetic fields on living organisms, especially man.

**Electromagnetic Radiation in Analysis and Design of Organic Materials**-Dana Ortansa Dorohoi 2017-01-27 Bridging condensed matter physics, photochemistry, photophysics, and materials science, *Electromagnetic Radiation in Analysis and Design of Organic Materials: Electronic and Biotechnology Applications* covers physical properties of materials in the presence of radiation from across the electromagnetic spectrum. It describes the optical, spectral, thermal, and morphological properties of a wide range of materials and their practical implications in electronic and biotechnologies. It discusses recent advances in the use of radiation in analysis of materials and design for advanced applications. The book contains experimental and theoretical issues that reflect the impact of radiation on materials characteristics highlighting their ease of analysis or adaptation for applications as optical filters, drug delivery systems, antimicrobial layers, amphetamine detectors, or liquid crystal displays.

**Coherent Interaction Between Electromagnetic Field and Two-level Atoms**-Abu Azad Haque 1987

**Basic Radiotherapy Physics and Biology**-David S. Chang 2021-02-20 This book is a concise and well-illustrated review of the physics and biology of radiation therapy intended for radiation therapists, dosimetrists, radiation oncology residents, and physicists. It presents topics that are included on the radiation therapy physics and biology board examinations and is designed with the intent of presenting information in an easily

digestible format with maximum retention in mind. The inclusion of mnemonics, rules of thumb, and reader-friendly illustrations throughout the book help to make difficult concepts easier to grasp. This new edition is updated throughout with the latest information and applications of radiation oncology physics and biology and includes four new chapters. New topics include: MRI linac, proton beam radiotherapy, chemomodulation and immunomodulation of radiation in vitro and in vivo, and stochastic and deterministic late effects. Basic Radiotherapy Physics and Biology is a valuable reference for radiation oncologists, medical professionals in the field, residents, and all students interested in radiation oncology.

**The Earth's Electric Field**-Michael C. Kelley 2013-09-21 The Earth's Electric Field provides you with an integrated and comprehensive picture of the generation of the terrestrial electric fields, their dynamics and how they couple/propagate through the medium. The Earth's Electric Field provides basic principles of terrestrial electric field related topics, but also a critical summary of electric field related observations and their significance to the various related phenomena in the atmosphere. For the first time, Kelley brings together information on this topic in a coherent way, making it easy to gain a broad overview of the critical processes in an efficient way. If you conduct research in atmospheric science, physics, atmospheric chemistry, space plasma physics, and solar terrestrial physics, you will find this book to be essential reading. The only book on the physics of terrestrial electric fields and their generation mechanisms, propagation and dynamics-making it essential reading for scientists conducting research in upper atmospheric, ionospheric, magnetospheric and space weather Covers the processes related to electric field generation and electric field coupling in the upper atmosphere along with providing new insights about electric fields generated by sources from sun to mud Focuses on real-world implications—covering topics such as space weather, earthquakes, the effect on power grids, and the effect on GPS and communication devices

**Electromagnetics and Calculation of Fields**-Nathan Ida 2013-03-07 This introduction to electromagnetic fields emphasizes the computation of fields and the development of theoretical relations. It presents the electromagnetic field and Maxwell's equations with a view toward connecting the disparate applications to the underlying relations, along with computational methods of solving the equations.

**Surface Electromagnetics**-Fan Yang 2019-06-20 Written by the leading experts in the field, this text provides systematic coverage of the theory, physics, functional designs, and engineering applications of advanced engineered electromagnetic surfaces. All the essential topics are included, from the fundamental theorems of surface electromagnetics, to analytical models, general sheet transmission conditions (GSTC), metasurface synthesis, and quasi-periodic analysis. A plethora of examples throughout illustrate the practical applications of surface electromagnetics, including gap waveguides, modulated metasurface antennas, transmit arrays, microwave imaging, cloaking, and orbital angular momentum (OAM) beam

generation, allowing readers to develop their own surface electromagnetics-based devices and systems. Enabling a fully comprehensive understanding of surface electromagnetics, this is an invaluable text for researchers, practising engineers and students working in electromagnetics antennas, metasurfaces and optics.

**Interaction of Radiation with Matter**-Hooshang Nikjoo 2016-04-19 Interaction of Radiation with Matter focuses on the physics of the interactions of ionizing radiation in living matter and the Monte Carlo simulation of radiation tracks. Clearly progressing from an elementary level to the state of the art, the text explores the classical physics of track description as well as modern aspects based on condensed mat

**Modeling and Simulation for Electric Vehicle Applications**-Mohamed Amine Fakhfakh 2016-10-05 The book presents interesting topics from the area of modeling and simulation of electric vehicles application. The results presented by the authors of the book chapters are very interesting and inspiring. The book will familiarize the readers with the solutions and enable the readers to enlarge them by their own research. It will be useful for students of Electrical Engineering; it helps them solve practical problems.

**Lasers in Biology and Medicine**-F. Hillenkamp 2013-03-09 This volume contains the lectures and seminars presented at the NATO Advanced Study Institute on Lasers in Biology and Medicine organized by the International School of Quantum Electronics at the Villa Le Pianore, Camaiore, Italy, August 19-31, 1979. Most laser applications in biology and medicine are highly interdisciplinary in nature, drawing from and pertaining to such diverse fields as the physical sciences ( (bio)physics, (bio)chemistry), engineering, the biological sciences (cellular research, photobiology) and finally theoretical and clinical medicine. Indeed the group of participants of the summer school did reflect this diversity both in background and interest. The presentations contained in this volume mainly fall into two categories: tutorial lectures on the most important general subjects, intended to lay a common base for all participants, and a number of more advanced contributions, serving the purpose of exemplifying selected but typical applications in their current state of development. Intense intercommunication, lively discussion, and here and there even future cooperation were the general aims more than a detailed in-depth discussion of one or the other aspect of this large field. In this sense it is the hope of the organizing committee that, despite the inevitable limitations, a broad and reasonably representative coverage of the field has been achieved and that this volume may be a valuable aid for newcomers to get a good start into this complex subject area for some years to come.