Functional Magnetic Resonance Imaging Second Edition

Texture Analysis for Magnetic Resonance ImagingMagnetic Resonance ImagingMagnetic Resonance Imaging of the Brain and SpineMagnetic Resonance ImagingBasics of Magnetic Resonance ImagingMagnetic Resonance ImagingMagnetic Resonance ImagingQuantitative Magnetic Resonance ImagingMagnetic Resonance ImagingCardiovascular Magnetic Resonance ImagingMagnetic Resonance ImagingIntroduction to Functional Magnetic Resonance ImagingMagnetic Resonance ImagingBiomedical Magnetic Resonance ImagingMagnetic Resonance ImagingInterventional Magnetic Resonance ImagingMagnetic Resonance ImagingMagnetic Resonance Imaging (MRI) for TechnologistMagnetic Resonance ImagingMagnetic Resonance Imaging in Obstetrics and Gynaecology Milan Hájek Vadim Kuperman Scott W. Atlas David D. Stark William Oldendorf Marinus T. Vlaardingerbroek Robert Sigal Nicole Seiberlich Robert W. Brown Raymond Y. Kwong Stewart C. Bushong Richard B. Buxton Stewart C. Bushong F. W. Wehrli Val M. Runge Thomas Kahn Federal-Provincial Advisory Committee on Institutional and Medical Services (Canada). Sub-Committee on Institutional Program Guidelines azmi banibaker Christakis Constantinides Martin C. Powell

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this book is intended as a text reference for students researchers and professors

interested in physical and biomedical applications of magnetic resonance imaging mri both the theoretical and practical aspects of mri are emphasized the book begins with a comprehensive discussion of the nuclear magnetic resonance nmr phenomenon based on quantum mechanics and the classical theory of electromagnetism the first three chapters of this book provide the foundation needed to understand the basic characteristics of mr images e g image contrast spatial resolution signal to noise ratio common image artifacts then mri applications are considered in the following five chapters both the theoretical and practical aspects of mri are emphasized the book ends with a discussion of instrumentation and the principles of signal detection in mri clear progression from fundamental physical principles of nmr to mri and its applications extensive discussion of image acquisition and reconstruction of mri discussion of different mechanisms of mr image contrast mathematical derivation of the signal to noise dependence on basic mr imaging parameters as well as field strength in depth consideration of artifacts in mr images comprehensive discussion of several techniques used for rapid mr imaging including rapid gradient echo imaging echo planar imaging fast spin echo imaging and spiral imaging qualitative discussion combined with mathematical description of mr techniques for imaging flow

established as the leading textbook on imaging diagnosis of brain and spine disorders magnetic resonance imaging of the brain and spine is now in its fourth edition this thoroughly updated two volume reference delivers cutting edge information on nearly every aspect of clinical neuroradiology expert neuroradiologists innovative renowned mri physicists and experienced leading clinical neurospecialists from all over the world show how to generate state of the art images and define diagnoses from crucial clinical pathologic mr imaging correlations for neurologic neurosurgical and psychiatric diseases spanning fetal cns anomalies to disorders of the aging brain highlights of this edition include over 6 800 images of remarkable quality more color images and new information using advanced techniques including perfusion and diffusion mri and functional mri a companion website will offer the fully searchable text and an image bank

cd rom contains the text of magnetic resonance imaging including over 270 images zoom functions and searching capabilities

this book is not intended as a general text on mri it is written as an intro duction to the field for nonexperts we present here a simple exposition of certain aspects of mri that are important to understand to use this valuable diagnostic tool intelligently in a clinical setting the basic principles are presented nonmathematically using no equations and a minimum of symbols and abbreviations for those requiring a deeper understanding of mri this book will help facilitate the transition to standard texts chapters 1 through 4 provide a general introduction to the phenomenon of nuclear magnetic resonance and how it is used in imaging chapter 1 discus ses magnetic

resonance using a compass needle as an example in chapter 2 the transition to the magnetic resonance of the atomic nucleus is made chapter 3 describes the principles of imaging in chapter 4 the terms t 1 and t 2 are described and their relationship to tissue characterization the fun damental role of thermal magnetic noise in t 1 and t 2 is discussed

when retired it is a blessing if one has not become too tired by the strain of one s professional career in the case of our retired engineer and scientist rinus vlaardingerbroek however this is not only a blessing for him person ally but also a blessing for us in the field of magnetic resonance imaging as he has chosen the theory of mri to be the work out exercise to keep himself in intellectual top condition an exercise which has worked out very well and which has resulted in the consolidated and accessible form of the work of reference now in front of you this work has become all the more lively and alive by illustrations with live images which have been added and analysed by clinical scientist jacques den boer we at philips medical systems feel proud of our comakership with the authors in their writing of this book it demonstrates the value we share with them which is to achieve clinical superiority in mri by quality and imagination during their careers rinus vlaardingerbroek and jacques den boer have made many contributions to the superiority of philips mri systems they have now bestowed us with a treasure offering benefits to the mri community at large and thereby to health care in general a much needed non diffuse textbook to help further advance the diffusion of mri

magnetic resonance imaging mri is a rapidly evolving technique which is having a significant impact on medical imaging only a few years ago al though nuclear magnetic resonance nmr was well known as an important analytical technique in the field of chemical analysis it was effectively un known in medical circles following the initial work of paul lauterbur and raymond damadian in the early 1970s demonstrating that it was possible to use nmr to produce im ages progress in the medical fields was relatively slow recently however with the availability of commercial systems progress has been very rapid with increasing acceptance of mri as a basic imaging technique and the develop ment of exciting new applications mri is a relatively complex technique first the image depends on many more intrinsic and extrinsic parameters than it does of in techniques like x ra diography and computed tomography and secondly the intrinsic parameters such as t1 and t2 are conceptually complex involving ideas not usually de scribed in traditional medical imaging courses in order to produce good mr images efficiently and to obtain the maximum information from them it is necessary to appreciate if not to fully understand these parameters further more knowledge of how the image is produced helps in appreciating the ori gin of the artifacts sometimes found in mri due to effects like patient motion and fluid flow

quantitative magnetic resonance imaging is a go to reference for methods and

applications of quantitative magnetic resonance imaging with specific sections on relaxometry perfusion and diffusion each section will start with an explanation of the basic techniques for mapping the tissue property in question including a description of the challenges that arise when using these basic approaches for properties which can be measured in multiple ways each of these basic methods will be described in separate chapters following the basics a chapter in each section presents more advanced and recently proposed techniques for quantitative tissue property mapping with a concluding chapter on clinical applications the reader will learn the basic physics behind tissue property mapping how to implement basic pulse sequences for the quantitative measurement of tissue properties the strengths and limitations to the basic and more rapid methods for mapping the magnetic relaxation properties t1 t2 and t2 the pros and cons for different approaches to mapping perfusion the methods of diffusion weighted imaging and how this approach can be used to generate diffusion tensor maps and more complex representations of diffusion how flow magneto electric tissue property fat fraction exchange elastography and temperature mapping are performed how fast imaging approaches including parallel imaging compressed sensing and magnetic resonance fingerprinting can be used to accelerate or improve tissue property mapping schemes how tissue property mapping is used clinically in different organs structured to cater for mri researchers and graduate students with a wide variety of backgrounds explains basic methods for quantitatively measuring tissue properties with mri including t1 t2 perfusion diffusion fat and iron fraction elastography flow susceptibility enabling the implementation of pulse sequences to perform measurements shows the limitations of the techniques and explains the challenges to the clinical adoption of these traditional methods presenting the latest research in rapid quantitative imaging which has the possibility to tackle these challenges each section contains a chapter explaining the basics of novel ideas for quantitative mapping such as compressed sensing and magnetic resonance fingerprinting based approaches

new edition explores contemporary mri principles and practices thoroughly revised updated and expanded the second edition of magnetic resonance imaging physical principles and sequence design remains the preeminent text in its field using consistent nomenclature and mathematical notations throughout all the chapters this new edition carefully explains the physical principles of magnetic resonance imaging design and implementation in addition detailed figures and mr images enable readers to better grasp core concepts methods and applications magnetic resonance imaging second edition begins with an introduction to fundamental principles with coverage of magnetization relaxation quantum mechanics signal detection and acquisition fourier imaging image reconstruction contrast signal and noise the second part of the text explores mri methods and applications including fast imaging water fat separation steady state gradient echo imaging echo planar imaging diffusion weighted imaging and induced magnetism lastly the text

discusses important hardware issues and parallel imaging readers familiar with the first edition will find much new material including new chapter dedicated to parallel imaging new sections examining off resonance excitation principles contrast optimization in fast steady state incoherent imaging and efficient lower dimension analogues for discrete fourier transforms in echo planar imaging applications enhanced sections pertaining to fourier transforms filter effects on image resolution and bloch equation solutions when both rf pulse and slice select gradient fields are present valuable improvements throughout with respect to equations formulas and text new and updated problems to test further the readers grasp of core concepts three appendices at the end of the text offer review material for basic electromagnetism and statistics as well as a list of acquisition parameters for the images in the book acclaimed by both students and instructors the second edition of magnetic resonance imaging offers the most comprehensive and approachable introduction to the physics and the applications of magnetic resonance imaging

the significantly updated second edition of this important work provides an up to date and comprehensive overview of cardiovascular magnetic resonance imaging cmr a rapidly evolving tool for diagnosis and intervention of cardiovascular disease new and updated chapters focus on recent applications of cmr such as electrophysiological ablative treatment of arrhythmias targeted molecular mri and t1 mapping methods the book presents a state of the art compilation of expert contributions to the field each examining normal and pathologic anatomy of the cardiovascular system as assessed by magnetic resonance imaging functional techniques such as myocardial perfusion imaging and assessment of flow velocity are emphasized along with the exciting areas of artherosclerosis plaque imaging and targeted mri this cutting edge volume represents a multi disciplinary approach to the field with contributions from experts in cardiology radiology physics engineering physiology and biochemistry and offers new directions in noninvasive imaging the second edition of cardiovascular magnetic resonance imaging is an essential resource for cardiologists and radiologists striving to lead the way into the future of this important field

dette er en grundlæggende lærebog om konventionel mri samt billedteknik den begynder med et overblik over elektricitet og magnetisme herefter gives en dybtgående forklaring på hvordan mri fungerer og her diskuteres de seneste metoder i radiografisk billedtagning patientsikkerhed m v

this is the second edition of a useful introductory book on a technique that has revolutionized neuroscience specifically cognitive neuroscience functional magnetic resonance imaging fmri has now become the standard tool for studying the brain systems involved in cognitive and emotional processing it has also been a major factor in the consilience of the fields of neurobiology cognitive psychology social psychology radiology physics mathematics engineering and even philosophy written

and edited by a clinician scientist in the field this book remains an excellent user s guide to t

the idea of using the enormous potential of magnetic resonance imaging mri not only for diagnostic but also for interventional purposes may seem obvious but it took major efforts by engineers physicists and clinicians to come up with dedicated interventional techniques and scanners and improvements are still ongoing since the inception of interventional mri in the mid 1990s the numbers of settings techniques and clinical applications have increased dramatically this state of the art book covers all aspects of interventional mri the more technical contributions offer an overview of the fundamental ideas and concepts and present the available instrumentation the richly illustrated clinical contributions ranging from mri guided biopsies to completely mri controlled therapies in various body regions provide detailed information on established and emerging applications and identify future trends and challenges

magnetic resonance imaging mri is a rapidly developing field in basic applied science and clinical practice research efforts in this area have already been recognized with five nobel prizes awarded to seven nobel laureates in the past 70 years based on courses taught at the johns hopkins university magnetic resonance imaging the basics provides a solid introduction to this powerful technology the book begins with a general description of the phenomenon of magnetic resonance and a brief summary of fourier transformations in two dimensions it examines the fundamental principles of physics for nuclear magnetic resonance nmr signal formation and image construction and provides a detailed explanation of the mathematical formulation of mri numerous image quantitative indices are discussed including among others signal noise signal to noise contrast and resolution the second part of the book examines the hardware and electronics of an mri scanner and the typical measurements and simulations of magnetic fields it introduces nmr spectroscopy and spectral acquisition and imaging techniques employing various pulse sequences the final section explores the advanced imaging technique of parallel imaging structured so that each chapter builds on the knowledge gained in the previous one the book is enriched by numerous worked examples and problem sets with selected solutions giving readers a firm grasp of the foundations of mri technology

magnetic resonance imaging in obstetrics and gynecology focuses on the potential of magnetic resonance imaging mri as a major imaging modality in the management of malignant diseases in the pelvis this text is organized into two parts encompassing 11 chapters that provide images obtained by mri in obstetrics and gynecology part one deals with the distinctive features of the normal uterus and vagina and those with carcinoma it also presents the images of the benign disease and carcinomous ovary part 2 considers images of the maternal anatomy placenta fetus and the gestational trophoblastic neoplasia this book is of great value to

obstetricians gynecologists and mri technicians

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