Magnetic Resonance Imaging: Physical Principles and Applications (Electromagnetism)

Vadim Kuperman
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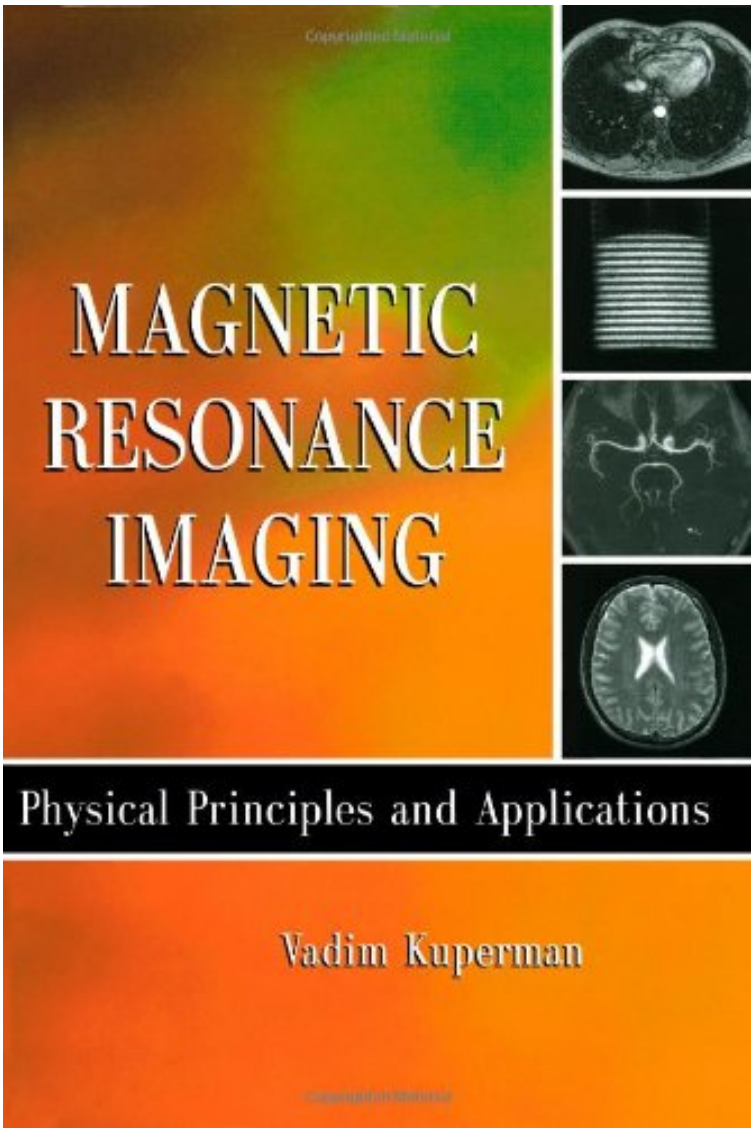

#9064133 in Books 2000-03-17Original language:EnglishPDF # 1 .72 x 6.27 x 9.32l, #File Name: 0124291503182 pages | File size: 59.Mb

Vadim Kuperman : Magnetic Resonance Imaging: Physical Principles and Applications (Electromagnetism) before purchasing it in order to gage whether or not it would be worth my time, and all praised Magnetic Resonance Imaging: Physical Principles and Applications (Electromagnetism):

0 of 1 people found the following review helpful. Great book on MRI.By Simon ShtivelbergThis is a very useful textbook which deal with the theory and practical applications of MRI. The first chapters examine the fundamentals of

magnetic resonance. The book includes a comprehensive discussion of the basic mechanisms of MR contrast including T1, T2-weighted images, diffusion weighted images, MRI imaging of flow. The last part of the book considers MRI instrumentation including design of superconducting and resistive magnets.1 of 1 people found the following review helpful. Not a bad overviewBy G. ColeThis book isn't a bad overview of basic MRI fundamentals. I would have liked it better if it had a bit more background in the basic physics involved because I've found that there is a HUGE gap between these basic beginning books and the advanced ones. The beginning ones assume you know nothing and the advanced ones assume you've got a PhD in high energy particle physics.

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 applicationsExtensive discussion of image acquisition and reconstruction of MRIDiscussion of different mechanisms of MR image contrastMathematical derivation of the signal-to-noise dependence on basic MR imaging parameters as well as field strengthIn-depth consideration of artifacts in MR imagesComprehensive discussion of several techniques used for rapid MR imaging including rapid gradient-echo imaging, echo-planar imaging, fast spin-echo imaging and spiral imagingQualitative discussion combined with mathematical description of MR techniques for imaging flow

"This book particularly stresses fast MR imaging and flow imaging. It does cover state-of-the-art topics such as echo-planar imaging, spiral imaging, and partial k-space aquisitions. The last chapter is dedicated to time-of-flight techniques and contrast-enhanced MRI of flow.This book is written well and is meant as a handy reference for students, researchers, and those interested in physical and biomedical applications of magnetic resonance imaging." -- Jasjit Suri, Marconi Medical Systems, Cleveland, IEEE ENGINEERING IN MEDICINE AND BIOLOGY, January/February 2001From the Back CoverThis book is intended as a text/reference for students and researchers 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 reader is then introduced to the principles of image reconstruction in MRI: the use of Fourier transform, point-spread function, spatial resolution, and aliasing. Basic MRI techniques for spatial encoding and commonly used imaging pulse sequences are considered in detail. The discussion then focuses on contrast mechanisms in MRI, as well as different techniques used to improve contrast in MR images. Due to the importance of signal-to-noise ratio (SNR) in terms of image quality, the subject of SNR is addressed, highlighting the dependence on SNR on imaging parameters and field strength. Following the SNR discussion, common artifacts in MRI as well as the developed techniques for artifact reduction are described. Two chapters are dedicated to the subject of flow imaging and rapid MRI required for state-of-the-art diagnostic medical imaging. Key Features: Clear progression from fundamental physical principles of NMR to MRI and its applicationsExtensive discussion of image acquisition and reconstruction of MRIDiscussion of different mechanisms of MR image contrastMathematical derivation of the signal-to-noise dependence on basic MR imaging parameters as well as field strengthIn-depth consideration of artifacts in MR imagesComprehensive discussion of several techniques used for rapid MR imaging including rapid gradient-echo imaging, echo-planar imaging, fast spin-echo imaging and spiral imagingQualitative discussion combined with mathematical description of MR techniques for imaging flowAbout the AuthorVadim Kuperman received his Ph.D. in physics from the Institute for High Temperatures in Moscow, Russia. He is affiliated with the Department of Radiology at the University of Chicago. As a magnetic resonance physicist, his interest lies in the development of both biomedical and physical applications of MRI.