# Magnetic Resonance Imaging: Mathematical Foundations and Applications

*Walter Johannes Schempp*

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Mathematical Foundations and Applications

By Walter J. Schempp

As magnetic resonance imaging (MRI) continues to transform medical diagnostics and the study of the brain, the necessity for a more precise description of this important clinical tool is increasingly evident. A mathematical understanding of MRI and the related imaging modalities of functional MRI and NMR spectroscopy can greatly improve many scientific and medical endeavors, from the quality of scans in the tomographic slices and their semantic interpretations to minimally invasive neurosurgery and research in cognitive neuroscience.

Magnetic Resonance Imaging advances a coherent mathematical theory of MRI and presents for the first time a real-world application of non-commutative Fourier analysis. Emphasizing the interdisciplinary nature of clinical MRI, this book offers an intriguing look at the geometric principles underlying the quantum phenomena of biomedical research. Author Walter J. Schempp, widely respected among mathematicians and neuro-network scientists alike, includes in this lucid, readable text:
* The historical and phenomenological aspects of NMR spectroscopy and clinical MRI
* A mathematical approach to the structure-function problem in clinical MRI
* Detailed descriptions of applications to medical diagnostics
* Photographs illustrating the superior contrast and spatial resolution achieved by MRI
* An extensive list of references.

Magnetic Resonance Imaging introduces clinical and mathematical concepts gradually and deliberately, making the complex procedure of MRI accessible to professionals in all areas of neuroscience and neurology, as well as those in mathematics, engineering, radiology, and physics.

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