

Preface

This work was accepted as a PhD thesis by the Faculty of Mathematics and Physics of the University of Freiburg, Germany. It spans five years of research conducted from April 2007 until March 2012.

In particular researchers and engineers who work in the field of biomedical engineering might profit from reading this text. A new approach of image encoding in magnetic resonance imaging is described: The fundamental principle of gradient linearity is challenged by investigating the possibilities of acquiring anatomical images with the help of nonlinear gradient fields. Besides a thorough theoretical analysis with a focus on signal encoding and image reconstruction, initial hardware implementations are tested using phantom as well as in-vivo measurements. Several applications are presented that give an impression about the implications that this technological advancement may have for future medical diagnostics.

Without the help of a great number of people, it would not have been possible to accomplish this piece of work.

Prof. Dr. Jürgen Hennig has given me the opportunity to become part of the amazing Medical Physics Group in Freiburg. It was his idea to combine parallel reception with nonlinear encoding fields, and I feel very fortunate that I could base my thesis on this intriguing and inspiring idea. He has given guidance and gave me abundant freedom to follow my own research interests, which he has always supported and promoted. Creativity at work and a vivid social life, most of what I have learned about science and many of the new friendships that I have found I owe to this unique working atmosphere. Thank you.

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It has been many hours that I have worked on this thesis. Each hour has been worthwhile. Thank you all!

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