Contents

Preface vii
Glossary of Symbols ix

I. Computerized Tomography
I.1 The basic example: transmission computerized tomography 1
I.2 Other applications 3
I.3 Bibliographical notes 8

II. The Radon Transform and Related Transforms 9
II.1 Definition and elementary properties of some integral operators 9
II.2 Inversion formulas 18
II.3 Uniqueness 30
II.4 The ranges 36
II.5 Sobolev space estimates 42
II.6 The attenuated Radon transform 46
II.7 Bibliographical notes 52

III. Sampling and Resolution 54
III.1 The sampling theorem 54
III.2 Resolution 64
III.3 Some two-dimensional sampling schemes 71
III.4 Bibliographical notes 84

IV. Ill-posedness and Accuracy 85
IV.1 Ill-posed problems 85
IV.2 Error estimates 92
IV.3 The singular value decomposition of the Radon transform 95
IV.4 Bibliographical notes 101

V. Reconstruction Algorithms 102
V.1 Filtered backprojection 102
V.2 Fourier reconstruction 119
V.3 Kaczmarz’s method 128