

Contents

Preface

Acknowledgments

1. Introduction	1
2. Reproducing kernel Hilbert spaces	20
§1 Fundamental theorems of linear transforms	20
§2 Elementary properties of reproducing kernel Hilbert spaces	34
§3 Generations of reproducing kernel Hilbert spaces	43
§4 Examples of reproducing kernels	53
§5 Realizations of reproducing kernel Hilbert spaces	87
3. Isometrical identities and inversion formulas	97
§1 Laplace and Fourier transforms	97
§2 The heat equation	128
§3 The wave equation	143
§4 Analytic and harmonic functions of class L_2	154
§5 The Meyer wavelets	168
4. Applications to the approximation of functions	178
§1 Best approximations by the functions in a RKHS	178
§2 Approximations in reproducing kernel Hilbert spaces	189
5. Applications to analytic extension formulas and real inversion formulas for the Laplace transform	200
§1 Representations of the norms in Bergman–Selberg spaces	200
§2 Real inversion formulas for the Laplace transform	211
6. Applications to source inverse problems	218
§1 Inverse source formulas in Poisson’s equation	218
§2 Inverse source formulas for Helmholtz’s equation	229

Appendix 1. Applications to representations of inverse functions	237
§1 A general approach	237
§2 Reasonable settings	239
§3 Examples	240
Appendix 2. Natural norm inequalities in nonlinear transforms	243
§1 General principles	243
§2 Concrete examples	248
Appendix 3. Stability of Lipschitz type in determination of initial heat distribution	259
§1 Introduction and theorem	259
§2 Proof of theorem	262
References	267
Books	267
Articles	272