

Contents

Preface	v
1 Spaces on \mathbb{R}^n	1
1.1 Definitions and basic assertions	1
1.1.1 Basic notation and isotropic spaces	1
1.1.2 Spaces with dominating mixed smoothness	4
1.1.3 Atoms	8
1.1.4 Wavelets	12
1.1.5 Complements	16
1.2 Properties, I	21
1.2.1 Introduction	21
1.2.2 Distinguished spaces	21
1.2.3 Homogeneity	28
1.2.4 Non-smooth atoms	31
1.2.5 Pointwise multipliers and localizations	35
1.2.6 Pointwise multipliers: General assertions	40
1.2.7 Local embeddings and isomorphic structure	45
1.3 Intermezzo: Key problems	53
1.3.1 Fourier multipliers	54
1.3.2 Embeddings	55
1.3.3 Traces	57
1.3.4 Dichotomy	62
1.3.5 Atoms, wavelets, pointwise multipliers	64
1.3.6 Fatou property	64
1.3.7 Extensions	65
1.3.8 Diffeomorphisms	66
1.3.9 Résumé	69
1.4 Properties, II	69
1.4.1 Pointwise multipliers: Special assertions	69
1.4.2 Multiplication algebras	77
1.4.3 Pointwise multipliers, revisited	83
1.4.4 Hölder inequalities	87
1.4.5 Caloric wavelets and smoothing	94
1.4.6 Thermic characterizations	97
1.4.7 Tempered homogeneous spaces with negative smoothness	102
1.4.8 Thermic characterizations, revisited	108

1.4.9	Tempered homogeneous spaces with positive smoothness . . .	112
1.4.10	Tempered homogeneous spaces with general smoothness . . .	119
2	Spaces on domains	123
2.1	Introduction	123
2.2	Localization spaces	125
2.2.1	Definitions and basic properties	125
2.2.2	Wavelet frames	127
2.3	Refined localization spaces	134
2.3.1	Preliminaries	134
2.3.2	Sobolev spaces	135
2.3.3	Besov spaces	138
2.4	Spaces on smooth domains	141
2.4.1	Motivations and preliminaries	141
2.4.2	Spaces with boundary data	150
2.5	Further properties	156
2.5.1	Faber frames	156
2.5.2	Haar frames	166
2.5.3	Further comments and some embeddings	171
2.5.4	Numerical integration: An example	173
2.5.5	Discrepancy	179
	Bibliography	185
	Symbols	197
	Index	201