

Contents

Abbreviations	xv
Preface	xvii
1 Introduction	1
1.1 Fourier transform	5
1.2 Spectal theory of pseudo-differential operators	7
1.3 Hankel transform	10
1.4 Watson transform	13
1.5 Localization operator and Wavelet multiplier	16
2 L_μ^p-spectra of pseudo-differential operators associated with the Bessel operator	19
2.1 Introduction	19
2.2 Minimal and Maximal pseudo-differential operators	21
2.3 Spectral properties of pseudo-differential operators	29
2.4 Applications	43
2.5 Conclusions	48
3 Hankel wavelet multiplier associated with the unitary representation	49
3.1 Introduction	49
3.2 Boundedness of the Hankel wavelet multiplier on $L^p(0, \infty)$	54
3.3 Hilbert-Schmidt operator and compactness	61
3.4 Applications of the Hankel wavelet multiplier and construction of Sobolev-type space	67
3.5 Hankel wavelet multiplier in Sobolev-type space	72
3.6 Conclusions	79
4 Wavelet multiplier associated with the Watson transform	81
4.1 Introduction	81
4.2 Boundedness of wavelet multipliers	88

4.3	Hilbert-Schmidt operator and compactness	95
4.4	Applications of the Watson wavelet multiplier	101
4.5	Watson Wavelet multiplier in Sobolev-type space	107
4.6	Trace class of the Watson wavelet multiplier	110
4.7	Conclusions	112
5	The localization operator and wavelet multipliers involving the Watson transform	113
5.1	Introduction	113
5.2	Properties of the localization operator	115
5.3	$L_{m_\nu}^p$ -boundedness of localization operators	121
5.4	Wavelet multipliers	123
5.5	Application of localization operators.	126
5.6	Conclusions	131
6	Watson wavelet transform: Convolution product and two wavelet multipliers	133
6.1	Introduction	133
6.2	Watson wavelet convolution product	137
6.3	Heuristic treatment of the Watson wavelet transform	150
6.4	Two wavelet multipliers	156
6.5	Conclusions	163
	Bibliography	165

Abbreviations

\mathbb{N}	Set of natural numbers
\mathbb{N}_0	Set of non-negative integers
\mathbb{R}^+ or I	Open interval $(0, \infty)$
\mathbb{R}	Set of real numbers
\mathbb{R}^n	Usual Euclidean space of dimension n
\mathbb{C}	Set of complex numbers
$E(x)$ or $[x]$	Integer part of x
$\ x\ $	Norm of x
$D_x \equiv \frac{\partial}{\partial x}$	Partial derivative with respect to variable x
<i>a.e.</i>	Almost everywhere
R.H.S.	Right hand side
L.H.S.	Left hand side

