

Cambridge University Press

978-0-521-79473-2 - Wavelets: Calderon-Zygmund and Multilinear Operators

Yves Meyer and Ronald Coifman

Table of Contents

[More information](#)


---

## Contents

	<b>Translator's note</b>	<b>x</b>
	<b>Preface to the English edition</b>	<b>xi</b>
	<b>Introduction</b>	<b>xiii</b>
	<b>Introduction to <i>Wavelets and Operators</i></b>	<b>xv</b>
	<b>7 The new Calderón-Zygmund operators</b>	
1	Introduction	1
2	Definition of Calderón-Zygmund operators corresponding to singular integrals	8
3	Calderón-Zygmund operators and $L^p$ spaces	13
4	The conditions $T(1) = 0$ and ${}^tT(1) = 0$ for a Calderón-Zygmund operator	22
5	Pointwise estimates for Calderón-Zygmund operators	24
6	Calderón-Zygmund operators and singular integrals	30
7	A more detailed version of Cotlar's inequality	34
8	The good $\lambda$ inequalities and the Muckenhoupt weights	37
9	Notes and additional remarks	41
	<b>8 David and Journé's <math>T(1)</math> theorem</b>	
1	Introduction	43
2	Statement of the $T(1)$ theorem	45
3	The wavelet proof of the $T(1)$ theorem	51
4	Schur's lemma	54
5	Wavelets and Vaguelets	56

Cambridge University Press

978-0-521-79473-2 - Wavelets: Calderon-Zygmund and Multilinear Operators

Yves Meyer and Ronald Coifman

Table of Contents

[More information](#)

vi	<i>Contents</i>	
6	Pseudo-products and the rest of the proof of the $T(1)$ theorem	57
7	Cotlar and Stein's lemma and the second proof of David and Journé's theorem	60
8	Other formulations of the $T(1)$ theorem	64
9	Banach algebras of Calderón-Zygmund operators	65
10	Banach spaces of Calderón-Zygmund operators	71
11	Variations on the pseudo-product	73
12	Additional remarks	76
	<b>9 Examples of Calderón-Zygmund operators</b>	
1	Introduction	77
2	Pseudo-differential operators and Calderón-Zygmund operators	79
3	Commutators and Calderón's improved pseudo-differential calculus	89
4	The pseudo-differential version of Leibniz's rule	93
5	Higher order commutators	96
6	Takafumi Murai's proof that the Cauchy kernel is $L^2$ continuous	98
7	The Calderón-Zygmund method of rotations	105
	<b>10 Operators corresponding to singular integrals: their continuity on Hölder and Sobolev spaces</b>	
1	Introduction	111
2	Statement of the theorems	112
3	Examples	114
4	Continuity of $T$ on homogeneous Hölder spaces	117
5	Continuity of operators in $\mathcal{L}_\gamma$ on homogeneous Sobolev spaces	119
6	Continuity on ordinary Sobolev spaces	122
7	Additional remarks	124
	<b>11 The <math>T(b)</math> theorem</b>	
1	Introduction	126
2	Statement of the fundamental geometric theorem	127
3	Operators and accretive forms (in the abstract situation)	128
4	Construction of bases adapted to a bilinear form	130
5	Tchamitchian's construction	132
6	Continuity of $T$	136
7	A special case of the $T(b)$ theorem	138
8	An application to the $L^2$ continuity of the Cauchy kernel	141

Cambridge University Press

978-0-521-79473-2 - Wavelets: Calderon-Zygmund and Multilinear Operators

Yves Meyer and Ronald Coifman

Table of Contents

[More information](#)

<i>Contents</i>		vii
9	The general case of the $T(b)$ theorem	142
10	The space $H_b^1$	145
11	The general statement of the $T(b)$ theorem	149
12	An application to complex analysis	150
13	Algebras of operators associated with the $T(b)$ theorem	150
14	Extensions to the case of vector-valued functions	152
15	Replacing the complex field by a Clifford algebra	153
16	Further remarks	155
<b>12 Generalized Hardy spaces</b>		
1	Introduction	157
2	The Lipschitz case	158
3	Hardy spaces and conformal representations	163
4	The operators associated with complex analysis	171
5	The “shortest” proof	178
6	Statement of David’s theorem	181
7	Transference	185
8	Calderón-Zygmund decomposition of Ahlfors regular curves	189
9	The proof of David’s theorem	191
10	Further results	194
<b>13 Multilinear operators</b>		
1	Introduction	195
2	The general theory of multilinear operators	197
3	A criterion for the continuity of multilinear operators	202
4	Multilinear operators defined on $(BMO)^k$	207
5	The general theory of holomorphic functionals	210
6	Application to Calderón’s programme	215
7	McIntosh’s theory of multilinear operators	220
8	Conclusion	226
<b>14 Multilinear analysis of square roots of accretive operators</b>		
1	Introduction	227
2	Square roots of operators	228
3	Accretive square roots	232
4	Accretive sesquilinear forms	236
5	Kato’s conjecture	238
6	The multilinear operators of Kato’s conjecture	239
7	Estimates of the kernels of the operators $L_m^{(2)}$	245
8	The kernels of the operators $L_m$	251

Cambridge University Press

978-0-521-79473-2 - Wavelets: Calderon-Zygmund and Multilinear Operators

Yves Meyer and Ronald Coifman

Table of Contents

[More information](#)

viii

*Contents*

9	Additional remarks	254
	<b>15 Potential theory in Lipschitz domains</b>	
1	Introduction	255
2	Statement of the results	256
3	Almost everywhere existence of the double-layer potential	261
4	The single-layer potential and its gradient	266
5	The Jerison and Kenig identities	270
6	The rest of the proof of Theorems 2 and 3	274
7	Appendix	275
	<b>16 Paradifferential operators</b>	
1	Introduction	277
2	A first example of linearization of a non-linear problem	278
3	A second linearization of the non-linear problem	280
4	Paradifferential operators	285
5	The symbolic calculus for paradifferential operators	288
6	Application to non-linear partial differential equations	292
7	Paraproducts and wavelets	294
	<b>References and Bibliography</b>	<b>298</b>
	<b>References and Bibliography for the English edition</b>	<b>311</b>
	<b>Index</b>	<b>313</b>