

## TABLE OF CONTENTS

### Part I : Wavelets

1. Introduction	1
2. Multiscale analysis	3
3. The function $\varphi$	6
4. Construction of $\psi$ in dimension 1	8
5. Wavelets in higher dimensions : tensor product	11
6. Other wavelets in higher dimensions	12
7. Compactly supported wavelets	15
8. Properties of the wavelet transform, extensions	23

### Part II : Singular integral operators

1. Introduction and generalities	26
2. First step of Coifman-Semmes' proof : a Riesz basis	32
3. Proof of the $T(b)$ -theorem when $Tb_1 = T^t b_2 = 0$	38
4. End of the proof : paraproducts	44
5. Comments on $T(b)$ , spaces of homogeneous type	47
6. Applications	48
A. More wavelets	49
B. The Cauchy integral and related operator	50

### Part III : Singular integrals on curves and surfaces

1. Introduction and notations	55
2. Calderón-Zygmund techniques	58
3. The "good $\lambda$ " method	60
4. Regular curves and Lipschitz graphs	64
A. Regular curves	64
B. The Cauchy integral on Lipschitz graphs again	66
5. Garnett's example	67
6. Three classes of surfaces	69
A. Chord-arc surfaces with small constant	69
B. $\omega$ -regular surfaces	71
C. Stephen Semmes surfaces	72
7. Finding big pieces : clouds and shadows	76
8. Bilipschitz mappings inside Lipschitz functions	79

<b>9. Square functions, geometric lemma and the corona construction</b>	<b>83</b>
<b>A. Square function estimates</b>	<b>83</b>
<b>B. P. Jones' geometric lemma</b>	<b>84</b>
<b>C. The corona construction</b>	<b>86</b>
<b>D. A characterization</b>	<b>88</b>
<b>10. A few questions</b>	<b>89</b>
<b>Appendix 1 : Construction of dyadic cubes on a regular set</b>	<b>93</b>
<b>Appendix 2 : Two recapitulatory diagrams</b>	<b>97</b>
<b>References</b>	<b>100</b>