

# Contents

<b>Notation</b>	<b>1</b>
<b>Introduction Générale</b>	<b>2</b>
<b>General Introduction</b>	<b>12</b>
<b>1 General Facts of Banach space Theory</b>	<b>21</b>
1.1 Bornologies, differentiability and linear operators . . . . .	21
1.2 Bases in Banach spaces . . . . .	23
1.3 Dynamics of linear operators . . . . .	24
<b>2 <math>\beta</math>-operators and differentiability</b>	<b>28</b>
2.1 Introduction . . . . .	28
2.2 Property $(S)$ and the construction of a Lipschitz function . . . . .	30
2.3 Characterization of $\beta$ -operators . . . . .	34
2.4 Alternative proof of Theorem 2.2 . . . . .	38
2.5 Some consequences of Theorem 2.5 . . . . .	39
2.5.1 Gelfand-Phillips spaces . . . . .	39
2.5.2 A Banach-Stone like theorem . . . . .	40
<b>3 Epsilon-Hypercyclicity Criterion</b>	<b>44</b>
3.1 Introduction . . . . .	44
3.2 A constructive proof of the epsilon-Hypercyclicity Criterion . . . . .	46
3.3 A topological proof of the Epsilon-Hypercyclic Criterion . . . . .	48
3.4 Infinite direct sum of a Banach space . . . . .	50
3.5 Construction of epsilon-hypercyclic operators . . . . .	51
3.6 A remark on the epsilon-Hypercyclicity Criterion . . . . .	58
3.7 Elementary results . . . . .	59
<b>4 Asymptotically separated sets and wild operators</b>	<b>60</b>
4.1 Introduction . . . . .	60
4.2 Asymptotically separated sets . . . . .	62
4.3 Construction of wild operators . . . . .	76
4.3.1 The complex case . . . . .	77
4.3.2 The real case . . . . .	80
4.4 Properties of wild operators . . . . .	82

4.5	Spectral properties of wild operators . . . . .	85
4.6	Approximation result . . . . .	89
<b>5</b>	<b>Desingularization of smooth sweeping processes</b>	<b>92</b>
5.1	Kurdyka-Łojasiewicz inequality . . . . .	92
5.2	Notation and Preliminaries . . . . .	94
5.2.1	Sweeping process dynamics . . . . .	95
5.2.2	Coderivative, (oriented) modulus and (oriented) talweg. . . . .	95
5.2.3	Desingularization of the coderivative (definable case). . . . .	97
5.3	Characterization of desingularization of the coderivative . . . . .	98
5.3.1	Assumptions, setting . . . . .	98
5.3.2	Characterizations via continuous dynamics . . . . .	100
5.3.3	Characterizations via discrete dynamics . . . . .	101
5.4	Proofs . . . . .	102
5.4.1	Auxiliary results . . . . .	102
5.4.2	Proof of Theorem 5.15 . . . . .	106
5.4.3	Oriented calmness . . . . .	108
5.4.4	Proof of Theorem 5.17. . . . .	111
5.5	A non-desingularizable smooth sweeping process . . . . .	112
<b>6</b>	<b>AML functions in two dimensional spaces</b>	<b>114</b>
6.1	Introduction . . . . .	114
6.2	Properties of AML functions and two dimensional spaces . . . . .	119
6.2.1	Comparison with cones . . . . .	119
6.2.2	Examples of AML functions . . . . .	120
6.2.3	The moduli $\alpha$ and $\rho$ . . . . .	121
6.3	Proof of Theorem 6.3 . . . . .	123
6.4	Proof of Theorem 6.4 . . . . .	128
6.5	AML functions with linear growth . . . . .	137
	<b>Conclusions</b>	<b>139</b>
	<b>Bibliography</b> . . . . .	<b>142</b>