

Cambridge University Press

978-0-521-09093-3 - Nonlinear Superposition Operators

Jurgen Appell and Petr P. Zabrejko

[Table of Contents](#)[More information](#)

Contents

Preface	1
Chapter 1	7
The superposition operator in the space S	
1.1 The space S	7
1.2 The superposition operator	10
1.3 Sup-measurable functions	12
1.4 Carathéodory and Shragin functions	16
1.5 Boundedness conditions	19
1.6 Continuity conditions	22
1.7 Compactness conditions	28
1.8 Special classes of functions	30
1.9 Notes, remarks and references	33
Chapter 2	39
The superposition operator in ideal spaces	
2.1 Ideal spaces	40
2.2 The domain of definition of the superposition operator	44
2.3 Local and global boundedness conditions	48
2.4 Special boundedness properties	54
2.5 Continuity conditions	58
2.6 Lipschitz and Darbo conditions	64
2.7 Differentiability conditions	70
2.8 Higher derivatives and analyticity	75
2.9 Notes, remarks and references	82
Chapter 3	89
The superposition operator in Lebesgue spaces	
3.1 Lebesgue spaces	90
3.2 Acting conditions	93
3.3 The growth function	96
3.4 Absolute boundedness and uniform continuity	100
3.5 Lipschitz and Darbo conditions	103
3.6 Differentiability conditions and analyticity	107
3.7 The case $p = \infty$ or $q = \infty$	110
3.8 The \mathcal{L} -characteristic	111
3.9 Notes, remarks and references	114

Cambridge University Press

978-0-521-09093-3 - Nonlinear Superposition Operators

Jurgen Appell and Petr P. Zabrejko

[Table of Contents](#)[More information](#)

Chapter 4	119
The superposition operator in Orlicz spaces	
4.1 Orlicz spaces	119
4.2 Acting conditions	125
4.3 Boundedness conditions	128
4.4 Continuity conditions	130
4.5 Lipschitz and Darbo conditions	131
4.6 Differentiability conditions and analyticity	134
4.7 Notes, remarks and references	136
Chapter 5	141
The superposition operator in symmetric spaces	
5.1 Symmetric spaces	141
5.2 Lorentz and Marcinkiewicz spaces	150
5.3 Acting conditions in symmetric spaces	155
5.4 Some properties in symmetric spaces	157
5.5 Notes, remarks and references	159
Chapter 6	163
The superposition operator in the spaces C and BV	
6.1 The space C	163
6.2 Some properties of Carathéodory functions	165
6.3 The superposition operator in the space C	167
6.4 The superposition operator between C and S	171
6.5 The superposition operator in the space BV	172
6.6 Notes, remarks and references	177
Chapter 7	181
The superposition operator in Hölder spaces	
7.1 Hölder spaces	182
7.2 Acting conditions	184
7.3 Boundedness conditions	188
7.4 Continuity conditions	191
7.5 Lipschitz and Darbo conditions	194
7.6 Differentiability conditions	197
7.7 The superposition operator in the space $\mathcal{J}_{\phi,p}$	198
7.8 Notes, remarks and references	200

Cambridge University Press

978-0-521-09093-3 - Nonlinear Superposition Operators

Jurgen Appell and Petr P. Zabrejko

[Table of Contents](#)[More information](#)

Chapter 8	205
The superposition operator in spaces of smooth functions	
8.1 The spaces C^k and H_ϕ^k	205
8.2 The superposition operator in the space C^k	207
8.3 The superposition operator in the space H_ϕ^k	215
8.4 The superposition operator in the space $R_\mu(L)$	217
8.5 The superposition operator in Roumieu classes	222
8.6 Notes, remarks and references	224
Chapter 9	227
The superposition operator in Sobolev spaces	
9.1 Sobolev spaces	227
9.2 Sufficient acting conditions in W_p^1	230
9.3 Necessary acting conditions in W_p^1	234
9.4 Boundedness and continuity conditions in W_p^1	239
9.5 Boundedness and continuity conditions in W_p^k	243
9.6 Degeneracy results	248
9.7 The superposition operator in Sobolev–Orlicz spaces	250
9.8 Notes, remarks and references	253
Bibliography	259
List of Symbols	297
Subject Index	303