

Contents

<i>Preface</i>	<i>page ix</i>	
1	Introduction	1
2	Discrete-time Hammerstein systems	3
2.1	The system	3
2.2	Nonlinear subsystem	4
2.3	Dynamic subsystem identification	8
2.4	Bibliographic notes	9
3	Kernel algorithms	11
3.1	Motivation	11
3.2	Consistency	13
3.3	Applicable kernels	14
3.4	Convergence rate	16
3.5	The mean-squared error	21
3.6	Simulation example	21
3.7	Lemmas and proofs	24
3.8	Bibliographic notes	29
4	Semirecursive kernel algorithms	30
4.1	Introduction	30
4.2	Consistency and convergence rate	31
4.3	Simulation example	34
4.4	Proofs and lemmas	35
4.5	Bibliographic notes	43
5	Recursive kernel algorithms	44
5.1	Introduction	44
5.2	Relation to stochastic approximation	44
5.3	Consistency and convergence rate	46
5.4	Simulation example	49
5.5	Auxiliary results, lemmas, and proofs	51
5.6	Bibliographic notes	58

6	Orthogonal series algorithms	59
6.1	Introduction	59
6.2	Fourier series estimate	61
6.3	Legendre series estimate	64
6.4	Laguerre series estimate	66
6.5	Hermite series estimate	68
6.6	Wavelet estimate	69
6.7	Local and global errors	70
6.8	Simulation example	71
6.9	Lemmas and proofs	72
6.10	Bibliographic notes	78
7	Algorithms with ordered observations	80
7.1	Introduction	80
7.2	Kernel estimates	81
7.3	Orthogonal series estimates	85
7.4	Lemmas and proofs	89
7.5	Bibliographic notes	99
8	Continuous-time Hammerstein systems	101
8.1	Identification problem	101
8.2	Kernel algorithm	103
8.3	Orthogonal series algorithms	106
8.4	Lemmas and proofs	108
8.5	Bibliographic notes	112
9	Discrete-time Wiener systems	113
9.1	The system	113
9.2	Nonlinear subsystem	114
9.3	Dynamic subsystem identification	119
9.4	Lemmas	121
9.5	Bibliographic notes	122
10	Kernel and orthogonal series algorithms	123
10.1	Kernel algorithms	123
10.2	Orthogonal series algorithms	126
10.3	Simulation example	129
10.4	Lemmas and proofs	130
10.5	Bibliographic notes	142
11	Continuous-time Wiener system	143
11.1	Identification problem	143
11.2	Nonlinear subsystem	144
11.3	Dynamic subsystem	146
11.4	Lemmas	146
11.5	Bibliographic notes	148

12	Other block-oriented nonlinear systems	149
12.1	Series-parallel, block-oriented systems	149
12.2	Block-oriented systems with nonlinear dynamics	173
12.3	Concluding remarks	218
12.4	Bibliographical notes	220
13	Multivariate nonlinear block-oriented systems	222
13.1	Multivariate nonparametric regression	222
13.2	Additive modeling and regression analysis	228
13.3	Multivariate systems	242
13.4	Concluding remarks	248
13.5	Bibliographic notes	248
14	Semiparametric identification	250
14.1	Introduction	250
14.2	Semiparametric models	252
14.3	Statistical inference for semiparametric models	255
14.4	Statistical inference for semiparametric Wiener models	264
14.5	Statistical inference for semiparametric Hammerstein models	286
14.6	Statistical inference for semiparametric parallel models	287
14.7	Direct estimators for semiparametric systems	290
14.8	Concluding remarks	309
14.9	Auxiliary results, lemmas, and proofs	310
14.10	Bibliographical notes	316
A	Convolution and kernel functions	319
A.1	Introduction	319
A.2	Convergence	320
A.3	Applications to probability	328
A.4	Lemmas	329
B	Orthogonal functions	331
B.1	Introduction	331
B.2	Fourier series	333
B.3	Legendre series	340
B.4	Laguerre series	345
B.5	Hermite series	351
B.6	Wavelets	355
C	Probability and statistics	359
C.1	White noise	359
C.2	Convergence of random variables	361
C.3	Stochastic approximation	364
C.4	Order statistics	365
	<i>References</i>	371
	<i>Index</i>	387