

Contents

<i>Preface</i>	vii
1 Linear filtering theory	1
1.1 Filtering theory in discrete time	2
1.2 Filtering theory in continuous time	11
2 Optimal stochastic control for linear dynamic systems with quadratic payoff	19
2.1 A brief review of the deterministic systems	20
2.2 Optimal stochastic control with complete observation	23
2.3 Optimal stochastic control with partial information: simplified approach	29
2.4 Complete solution of the optimal stochastic control problem with partial information	36
3 Optimal control of linear stochastic systems with an exponential-of-integral performance index	53
3.1 The full observation case	54
3.2 The partial observation case	59
3.3 Additional remarks to the partial information case	72
4 Non linear filtering theory	74
4.1 Non linear filtering equation	76
4.2 Uniqueness theorem	89
4.3 Equation of the conditional probability	94
4.4 An explicit solution	101
4.5 Correlation between the signal noise and the observation noise	105
4.6 Some representation formulas for the conditional probability	114
4.7 Study of stochastic PDEs	126
4.8 Concluding remarks	135
5 Perturbation methods in non linear filtering	136
5.1 Linear systems with small noise in the observation	138
5.2 Non linear systems with small noise in the observation	146
5.3 Dynamic systems with small noise and small signal to noise ratio	167
5.4 Non linear filtering for dynamic systems with singular perturbations	177

6	Some explicit solutions of the Zakai equation	190
6.1	Non gaussian initial condition	192
6.2	Explicit solution in the case of a non linear drift	197
6.3	The conditionally gaussian case	204
7	Some explicit controls for systems with partial observation	222
7.1	The separation principle	223
7.2	The Bellman equation for the separated problem when U_{ad} is bounded	227
7.3	Solution of the stochastic control problem with partial information when U_{ad} is bounded	233
7.4	Solution of the Bellman equation in some particular cases, with bounded controls	238
7.5	Solution of the predicted-miss and minimum distance problems	246
7.6	An extension of the concept of solution	253
8	Stochastic maximum principle and dynamic programming for systems with partial observation	268
8.1	Setting of the problem	270
8.2	Stochastic maximum principle	276
8.3	Applications of the stochastic maximum principle	289
8.4	Preliminaries to dynamic programming	297
8.5	Stationary dynamic programming	305
8.6	Non stationary dynamic programming	314
8.7	Non linear semigroup	323
9	Existence results for stochastic control problems with partial information	326
9.1	Notation: setting of the problem	327
9.2	Stochastic optimal control	330
9.3	Existence of a solution	336
	<i>References</i>	340
	<i>Index</i>	351