

Contents

1	Introduction and Preview	1
1.1	Introduction	1
1.2	Problem Formulation and Preliminaries	4
1.2.1	Output Feedback H_∞ Control	4
1.2.2	H_∞ Filtering	5
1.2.3	LMI and Matrix Properties	6
	References	14
2	Robust Static Output Feedback H_∞ Control	17
2.1	With Time-Invariant Polytopic Uncertainties	17
2.1.1	Discrete-Time Systems	17
2.1.2	Continuous-Time Systems	74
2.2	With Norm Bounded Uncertainties	83
2.3	Numerical Examples	90
2.3.1	Example 1	90
2.3.2	Example 2	90
2.4	Conclusion	93
	References	93
3	Robust Dynamic Output Feedback H_∞ Control	95
3.1	Problem Formulation	95
3.2	Basic Results	96
3.3	LMI Decoupling Approach	102
3.4	A Whole Design Strategy	110
3.5	For the Case $D(\theta) \neq 0$ and $H(\theta) \neq 0$	120
3.6	Example	122
3.7	Conclusion	123
	References	124
4	Robust Observer-Based Output Feedback H_∞ Control	125
4.1	With Time-Invariant Polytopic Uncertainties	125
4.1.1	Condition A	127
4.1.2	Condition B	132

4.2	With Time-Varying Norm Bounded Uncertainties	135
4.2.1	The Two-Step Process with a Selection	135
4.2.2	A Simple LMI Result	141
4.2.3	LMI Decoupling Approach.	145
4.3	Conclusion	152
	References	153
5	Robust H_∞ Filtering.	155
5.1	Discrete-Time System	155
5.1.1	H_∞ Performance Analysis	156
5.1.2	Robust H_∞ Filters Design	160
5.1.3	LMI Decoupling Approach.	174
5.2	Continuous-Time Systems	177
5.2.1	H_∞ Performance Analysis	177
5.2.2	Robust H_∞ Filters Design	181
5.3	Numerical Example	189
5.4	Conclusion	189
	References	190
6	With Other Types of Uncertainties	191
6.1	With Feedback Uncertainties	191
6.1.1	Robust Output Feedback H_∞ Control	191
6.1.2	Robust H_∞ Filtering	200
6.1.3	Output Feedback Non-fragile H_∞ Control with Type III	211
6.1.4	Non-fragile H_∞ Filtering with Type I and Type II	218
6.2	Frobenius Norm Uncertainties.	233
6.2.1	Observer-Based Output Feedback Non-fragile H_∞ Control.	234
6.2.2	Example	241
6.3	Conclusion	244
	References	244
	Glossary	245