

Contents

1	Introduction	1
1.1	Switched Systems	1
1.2	Backgrounds and Motivations	2
1.3	Mathematical Descriptions	4
1.4	Classifications of Switching Signals	6
1.4.1	Different Perspectives for Classifications	6
1.4.2	Several Typical Time-Dependent Switching Signals	7
1.5	Comparisons with Other Types of Hybrid Systems	10
1.6	Overview of Control and Filtering of Switched Systems	13
	References	18
2	Stability and Stabilization	27
2.1	Multiple Lyapunov-Like Functions	27
2.2	Arbitrary Switching	32
2.3	Dwell Time (DT) Switching	36
2.4	Average Dwell Time (ADT) Switching	41
2.5	Persistent Dwell Time (PDT) Switching	50
2.6	Conclusion	57
	References	57
3	Performance Analysis	59
3.1	l_2 -Gain Analysis: Arbitrary Switching	59
3.2	Weighted l_2 -Gain Analysis: ADT Switching	63
3.3	Non-Weighted l_2 -Gain Analysis: PDT Switching	70
3.4	Tube-Based Robustness Analysis: Modal PDT Switching	77
3.5	Conclusion	84
	References	85
4	Control	87
4.1	Robust H_∞ Control: Arbitrary Switching	87
4.1.1	Parameter-Independent Control	88
4.1.2	Parameter-Dependent Control	93

4.2	Robust H_∞ Control: ADT Switching	101
4.3	Observer-Based H_∞ Control: Modal PDT Switching	104
4.4	Conclusion	125
	References	125
5	Filtering	127
5.1	Robust H_∞ Filtering: Arbitrary Switching	127
5.2	Robust H_∞ Filtering: ADT Switching	135
5.2.1	Uncertain Switched Linear Systems	135
5.2.2	Switched Linear Parameter Varying (LPV) Systems	144
5.3	Quasi-Time-Dependent (QTD) H_∞ Filtering: PDT Switching	152
5.4	Conclusion	160
	References	161
6	Asynchronous Switched Systems: ADT Switching	163
6.1	New Stability Analysis	163
6.2	New Performance Analysis	167
6.3	Asynchronous Stabilization	174
6.4	H_∞ Control	177
6.4.1	Switched Linear Systems	177
6.4.2	Switched LPV Systems	186
6.5	H_∞ Filtering	193
6.6	Conclusion	203
	References	203
7	Time-Delay Switched Systems	205
7.1	Stability Analysis: DT Switching	206
7.2	H_∞ Control: Arbitrary Switching	213
7.2.1	Performance Analysis	215
7.2.2	Output-Feedback Controller Design	220
7.3	Filtering	227
7.3.1	$l_2 - l_\infty$ Sense: Arbitrary Switching	227
7.3.2	H_∞ Sense: PDT Switching	240
7.4	Conclusion	252
	References	254
	Index	257

Time-Dependent Switched Discrete-Time Linear
Systems: Control and Filtering

Zhang, L.; Zhu, Y.; Shi, P.; Lu, Q.

2016, XIV, 258 p. 72 illus., 23 illus. in color., Hardcover

ISBN: 978-3-319-28849-9