

Contents

Abstract	v
List of Figures	xi
Nomenclature	xiii
1 Introduction	1
1.1 Literature Review	4
1.1.1 Rated Convergence	4
1.1.2 Sliding Mode Control	6
1.1.3 Parameter and State Estimation	7
1.1.4 Polytopic Systems	9
1.1.5 Guidance Law	9
1.2 Motivation	11
1.3 Objectives	13
1.4 Organization of the Thesis	13
2 Preliminaries	15
2.1 Notations	15
2.2 Stability Notions and Definitions	16
2.3 Important Lemmas	17
2.4 High-Gain Observer	18
2.5 Planar Missile-Target System	19
2.5.1 Non-Maneuvering Target	20
2.5.2 Constant Maneuvering Target	20
2.5.3 Time-varying Maneuvering Target	20

3 Design of Switched High-Gain Observer for Nonlinear Systems	21
3.1 Introduction	21
3.2 Preliminaries and Problem Formulation	22
3.3 Design of Switched High-Gain Observer	24
3.4 Simulation Results	31
3.5 Summary	37
4 Parameter Estimation for a Class of Uncertain Systems: An Adaptive Super-Twisting Approach	39
4.1 Introduction	39
4.2 Problem Formulation	40
4.3 Parameter Estimation using Adaptive Super-Twisting Algorithm	41
4.4 Illustrative Example	49
4.5 Simulation Results	51
4.6 Summary	56
5 Nonlinear Polytopic Systems with Predefined-Time Convergence	57
5.1 Introduction	57
5.2 Problem Formulation	58
5.3 Predefined-Time Control	59
5.4 Simulation results	66
5.5 Summary	68
6 Design of Guidance Law for Planar Missile-Target System	69
6.1 Introduction	69
6.2 Problem Formulation	70
6.3 Adaptive Super-Twisting Guidance Law with Extended State Observer . .	71
6.3.1 Adaptive Super-Twisting Guidance Law	71
6.3.2 Guidance Law with Extended State Observer	78
6.3.3 Simulation results	80
6.4 Adaptive Super-Twisting Guidance Law: An Event-Triggered Approach .	82
6.4.1 Design of Guidance Law	83

6.4.2	Analysis of Inter-Event Time	89
6.4.3	Simulation results	90
6.5	Guidance Law with Predefined-Time Convergence	92
6.5.1	Design of Guidance Law	93
6.5.2	Simulation results	97
6.6	Summary	100
7	Conclusions and Future Scopes	101
7.1	Conclusions	101
7.2	Future Scopes	102
A	List of Publications	103
A.1	Journal papers	103
A.2	Conference papers	103