

**Robust Missile Autopilot Design via Multiple-Surface  
Sliding Mode Control**

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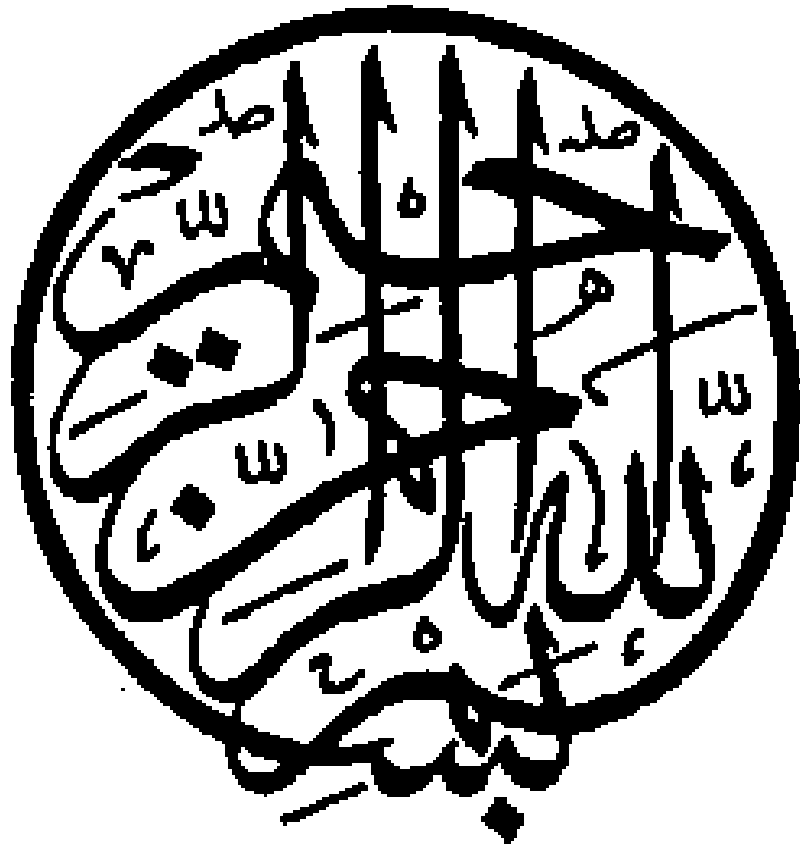
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## **ABSTRACT**

This work presents a robust autopilot structure for longitudinal dynamics of a missile via multiple-surface sliding mode control. The proposed control structure results in simple and flexible design with increased robustness as compared to already presented designs. The basic idea is to minimize the normal position and velocity deviations (guidance errors) when a trajectory following guidance is employed. The proposed controller assumes a completely uncertain statically stable plant dynamics in pitch plane and the control law is just based on sliding mode rate reaching laws ensuring the stability of the system via Lyapunov direct method. The proposed control strategy is applied to a hypothetical tail controlled missile system in pitch plane. The performance of the overall nonlinear control system is analyzed in the presence of environmental disturbances using a nonlinear/Six DOF simulator. Simulation results show that the proposed algorithm is able to give good performance regardless of the uncertainties and time varying disturbances.

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# CONTENTS

<b>ABSTRACT</b> .....	iii
<b>ACKNOWLEDGEMENT</b> .....	iv
<b>TABLE OF CONTENTS</b> .....	v
<b>LIST OF FIGURES</b> .....	vii
<b>CHAPTER 1</b> .....	1
<b>INTRODUCTION</b> .....	1
1.1 MOTIVATION .....	1
1.2 BALLISTIC MISSILE BASICS .....	1
1.2.1 MISSILE COMPONENTS .....	1
1.2.2 GUIDANCE SYSTEM .....	2
1.2.3 NAVIGATION SYSTEM.....	2
1.2.3 CONTROL SYSTEM .....	2
1.3 SCOPE OF THE WORK .....	3
1.4 CHAPTERS ORGANISATION .....	3
<b>CHAPTER 2</b> .....	5
<b>LITERATURE REVIEW</b> .....	5
2.1 INTRODUCTION.....	5
2.2 BRIEF STUDY UNDERTAKEN.....	5
2.2 BRIEF STUDY UNDERTAKEN .....	6
2.2 BRIEF STUDY UNDERTAKEN.....	7
2.3 SUMMARY .....	8
<b>CHAPTER 3</b> .....	9
<b>SYSTEM DESCRIPTION</b> .....	9
3.1 INTRODUCTION.....	9
3.2 BLOCK DIAGRAM .....	9
3.3 GUIDANCE SCHEME.....	10
3.4 AIRFRAME DYNAMICS .....	10
3.4.1 DYNAMICS LINEARIZATION.....	15

3.5 ACTUATOR .....	19
3.6 INERTIAL MEASUREMENT UNIT.....	19
3.7 AUTOPILOT.....	20
3.8 SUMMARY .....	21
<b>CHAPTER 4 .....</b>	<b>22</b>
<b>ROBUST AUTOPILOT DESIGN .....</b>	<b>22</b>
4.1 INTRODUCTION.....	22
4.2 SLIDING MODE CONTROL .....	22
4.3 PROPOSED CONTROL STRATEGY.....	23
4.4 SYSTEM STABILITY ANALYSIS.....	25
4.5 TUNING PROCEDURE.....	26
4.6 SMC IMPLEMENTATION.....	26
4.7 SUMMARY .....	28
<b>CHAPTER 5 .....</b>	<b>29</b>
<b>RESULTS AND ANALYSIS.....</b>	<b>29</b>
5.1 INTRODUCTION.....	29
5.3 DYNAMICS VALIDATION.....	29
5.3 LINEAR SYSTEM SIMULATION.....	31
5.4 SIMULATION USING NONLINEAR SIXDOF SIMULATOR.....	33
5.5 SYSTEM ROBUSTNESS ANALYSIS .....	38
5.6 SUMMARY .....	47
<b>CHAPTER 6 .....</b>	<b>48</b>
<b>CONCLUSION AND FUTURE WORK.....</b>	<b>48</b>
6.1 CONCLUSION .....	48
6.2 BENEFITS .....	48
6.3 FUTURE WORK RECOMMENDATION.....	49
<b>APPENDIX A .....</b>	<b>50</b>
<b>APPENDIX B.....</b>	<b>51</b>
<b>REFERENCES .....</b>	<b>52</b>

## LIST OF FIGURES

Figure 3.1: Block diagram of the flight control system.....	9
Figure 3.2: Missile dynamic variables.....	10
Figure 3.3: Three dimensional missile kinematics .....	13
Figure 3.4: PZ map for open loop transfer function .....	18
Figure 4.1: SMC graphical illustration. ....	22
Figure 4.2: Genaral SMC based Misile autopilot structure. ....	23
Figure 4.3: Convergence of the states to the intersection of sliding surfaces.....	24
Figure 4.4: Chattering phenomenon. ....	27
Figure 4.5: Signum and saturation function.....	27
Figure 5.1: Control Input “ $\delta$ ” Given to the System. ....	30
Figure 5.2: Angle of attack. ....	30
Figure 5.3: Pitch angle rates.....	31
Figure 5.4: Normal acceleration tracking. ....	32
Figure 5.5: Initial inverse step response. ....	33
Figure 5.6: Positional guidance error.....	35
Figure 5.7: Velocity guidance error. ....	35
Figure 5.8: Elevator fin deflection.....	36
Figure 5.9: Body pitch rates.....	36
Figure 5.10: Acceleration command tracking.....	37
Figure 5.11: Flight trajectory with nominal disturbance. ....	37
Figure 5.12: Positional guidance error.....	39
Figure 5.13: Velocity guidance error. ....	39
Figure 5.14: Elevator fin deflection.....	40
Figure 5.15: Body pitch rates.....	40
Figure 5.16: Acceleration command tracking.....	41
Figure 5.17: Flight trajectory with increasing range disturbance. ....	41
Figure 5.18: Positional guidance error.....	43
Figure 5.19: Velocity guidance error. ....	43

Figure 5.20: Elevator fin deflection .....	44
Figure 5.21: Body pitch rates.....	44
Figure 5.22: Acceleration command tracking.....	45
Figure 5.23: Flight trajectory with decreasing range disturbance.....	45

## LIST OF TABLES

Table 5.1: Matlab Simulation parameters.....	32
Table 5.2: Applied Disturbances and parametric variations.....	39
Table 5.3: Applied Disturbances and parametric variations.....	42
Table 5.4: Comparision of results.....	46
Table A: Autopilot gains for pitch channel.....	50
Table B: System Parameteric variations.....	51