Robust Missile Autopilot Design via Multiple-Surface Sliding Mode Control

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THESIS

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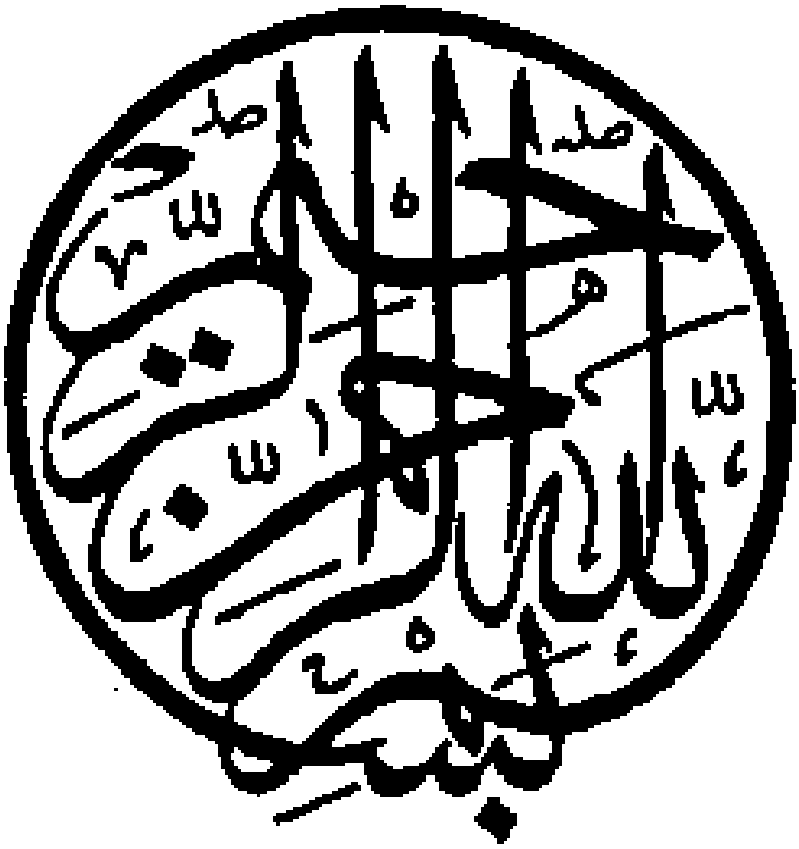

ABSTRACT

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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