

INTEGRATED GUIDANCE AND CONTROL DESIGN FOR MISSILE WITH TERMINAL IMPACT ANGLE CONSTRAINT

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Abstract. According to the requirements of some types of missile which attack targets with terminal impact angle constraint at the terminal point, a new integrated guidance and control design scheme based on variable structure control approach for missile with terminal impact angle constraint is presented. First, a mathematical model of an integrated guidance and control model in pitch plane is established, and then nonlinear transformation is employed to transform the mathematical model into a standard form suitable for nonlinear control theory method design. To verify the effectiveness of the proposed integrated design scheme, the numerical simulation of missile has been made, the simulation results demonstrate that the proposed guidance and control law can guide missile to hit the target with desired impact angle and desired flight attitude angle simultaneously.

Keywords. Integrated guidance and control law; terminal impact angle; variable structure control.

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1 Introduction

Traditional separate design of guidance and control logic has been a dominant method for homing missile. Whereas traditional approaches previously have been proved to be efficient, the cooperation between subsystems is hardly smooth. As a result, guidance and control circuits can't work synergistically, and the performance of overall missile system is not fully exploited. To improve the overall performance of missile systems, integrated guidance and control design, which can maximize the adjustability of missiles and improve accuracy of hitting targets, will become dominant in perspective of guidance and control design of missiles. It is known that integrated guidance and control design method can help to improve the hitting performance[1-3].

Many kinds of missiles are hoped not only to get a minimum miss-distance but also to get a desired terminal angle so that the warhead of the missile can acquire a better kill effect. For example, an anti-ballistic missile is required