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三维制导的几何方法与鲁棒控制方法

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GEOMETRIC APPROACH AND ROBUST CONTROL APPROACH TO THREE-DIMENSIONAL MISSILE GUIDANCE

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摘要 在考虑导弹速度和目标速度均为时变的情况下,将微分几何方法与李雅普诺夫稳定理论结合起来,提出了一种导弹三维导引规律设计新方法。对机动目标,PPNG方法的主要问题是在导引末段,它要求导弹在俯仰和偏航通道上具有较大的加速度,为了解决这一问题,本文应用基于李雅普诺夫稳定理论的鲁棒控制方法,提出了一种三维鲁棒制导算法。这种方法在导引末段不需要过大的加速度命令,不需要知道目标精确的加速度和速度方位信息

关键词: 微分几何 李雅普诺夫稳定 三维制导 机动目标 鲁棒控制

Abstract: Considering the varying of velocity of the missile and target, the classical differential geometry curve theory approach and Lyapunov stability theory are combined to create a new design approach to three dimensional missile guidance problems. The main drawback of PPNG (pure proportional navigation guidance) against a maneuvering target is that biggish acceleration commands in pitch and yaw channels of the missile are required in the final stage of the engagement. To solve this problems, a robust three dimensional missile guidance algorithm is presented by using a robust control method based on Lyapunov stability theory. No biggish acceleration commands of the missile are required in the final stage of the engagement in the proposed algorithm, and also, no accurate information on the acceleration and velocity relative heading angle of the target is required.

Keywords: differential g eom etry Ly apunov stability three-dimensio nal g uidance maneuver ing t arg et robustcontr ol

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