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论文

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增程制导炮弹气动外形设计

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Aerodynamic Configuration Design for Extended Range Guided Munition

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摘要

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摘要 依据增程制导炮弹气动外形设计中需考虑的主要问题,分析了火箭助推-滑翔增程制导炮弹的弹道特点,进行了增程制导炮弹的气动外形设计和雷达散射截面(RCS)计算;实验结果表明:在 $Ma=2.5\sim 3.5$ 范围内,增程制导炮弹的零阻比原外形方案的零阻约减少了30%;纵向静稳定度从原方案的4.5%提高到了9%;舵偏角与平衡攻角匹配合理,有较高的滑翔增程能力;RCS计算结果表明,在迎面 $\pm 30^\circ$ 及 $\pm 60^\circ$ 范围内,增程制导炮弹都具有较小的雷达散射截面。

关键词: 增程制导炮弹 气动外形设计 气动特性 风洞实验 雷达截面

Abstract: Three key problems in the aerodynamic configuration design for Extended Range Guided Munition (ERGM) are expounded, and the trajectory characteristic of ERGM is analyzed. Based upon these, ERGM aerodynamic configuration is designed. The radar cross sections (RCS) of the configuration are computed by using the physical optics method. Comparing the designed configuration with the original configuration, for the Mach number from 2.5 to 3.5, the wind tunnel experimental results indicate that the zero-lift drag coefficient decreases by 30%, and the static stability increases from 4.5% to 9%. Moreover, the rudder deflection angle matches reasonably with the balance angle of attack, so the ERGM has super glide ability. RCS computational results show that the ERGM has smaller radar cross section at head-on scope of $\pm 30^\circ$ and $\pm 60^\circ$.

Keywords: extended range guided munition(ERGM) aerodynamic configuration design aerodynamic characteristic wind tunnel experiment radar cross section(RCS)

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