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# 40mm 弹四旋翼结构建模

## 摘要

40mm 四旋翼弹在发射之后可以在空中悬停，而且能够沿任意方向飞行并进行目标识别和打击。具有广阔的军事用途。

为了分析 40mm 四旋翼弹在飞行过程中各机构的工作状况，本文主要研究将四旋翼结构应用于 40mm 弹上，阐述了 40mm 弹四旋翼结构的建模及仿真的全过程。采用 PRO/E 建立 40mm 弹四旋翼结构的三维模型。采用 ADAMS 动力学分析系统建立 40mm 弹四旋翼结构的动力学模型,最后得出相应的运动特性曲线，并进行相应的性能分析。

通过 ADAMS 动力学分析可以得出，在理想状态下，40mm 四旋翼弹的运动是先斜向上升高，此时速度逐渐降低，加速度不变；当 40mm 四旋翼弹上升到最高点时，翼架展开，高度趋于稳定，此时速度在一定范围之内波动变化；最后给 40mm 四旋翼弹施加一个向下的加速度使其急剧下降，模拟识别目标进行毁伤的过程。

**关键词：**40mm 弹；四旋翼结构；动力学仿真；ADAMS

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## Abstract

The 40mm quadrotor can hover in the air after launch, and can fly in any direction and perform target recognition and strike. It has broad military applications.

In order to analyze the working conditions of various institutions during the flight of a 40mm quadrotor missile, this paper mainly studies the application of the quadrotor structure to a 40mm missile, and describes the whole process of modeling and simulation of the 40mm quadrotor structure. Using PRO/E to build a three-dimensional model of a 40mm projectile quadrotor structure. The dynamic model of 40mm projectile with four rotors was established by using Adams dynamic analysis system, and finally the corresponding motion characteristic curve was obtained, and the corresponding performance analysis was carried out.

Through ADAMS dynamic analysis, it can be concluded that in an ideal state, the motion of the 40mm quadrotor is first to increase diagonally, at this time the speed gradually decreases, and the acceleration remains unchanged; when the 40mm quadrotor rises to the highest point, the wing frame Unfolding, the height tends to be stable, at this time the speed fluctuates within a certain range; finally, a downward acceleration is applied to the 40mm four-rotor projectile to make it fall sharply, simulating the process of identifying the target for damage.

**Keywords:** 40mm projectile; four-rotor structure; dynamic simulation; ADAMS

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