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# Selecting the optimum battery for a multi-rotor unmanned electric helicopter (multicopter)

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*The study deals with selecting a rechargeable battery mass that ensures maximum flight duration for an electric multicopter in hover mode, taking into account the changes in the electric motor energy conversion efficiency. As a result of studying a refined model that takes into account the changes in energy conversion efficiency, we discovered that using a relative battery mass between 1 and 2 leads to achieving the maximum flight duration in hover mode. The relative mass value corresponding to the maximum in time greatly depends on how rigid the speed-torque characteristic of the engine is, and depends on the thrust-to-weight ratio to a lesser degree. Taking into account the energy conversion efficiency of the engine does not really affect relative battery mass values that are determined using the integral and differential criteria. We can recommend designers to use the values we obtained for the relative battery mass.*

**Keywords:** multi-rotor unmanned electric helicopter, multicopter, rechargeable battery, maximum flight duration, relative battery mass, thrust-to-weight ratio, energy conversion efficiency, brushless electric motor

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