

RADIO-CONTROLLED AIRCRAFTS

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Анотація

У даній статті подано основну інформацію про радіокеровані гелікоптери. Представлено основні прилади радіокерованого пілотування. Також розглянуто актуальність даного питання і його важливість для сучасного життя.

Ключові слова: радіоуправління, автоматика, гелікоптер, бездротовий.

Abstract

This article contains basic information on radio-controlled aircrafts. The basic types of radio-controlled aircrafts are introduced. The urgency of the issue and its importance for the modern life were regarded.

Keywords: radio-control, automation, helicopter, wireless.

A radio-controlled aircraft (often called RC aircraft or RC plane) is a small flying machine controlled remotely by an operator on the ground using a hand-held radio transmitter. The transmitter communicates with a receiver within the craft that sends signals to servomechanisms (servos), which move the control surfaces based on the position of joysticks on the transmitter. The control surfaces, in turn, affect the orientation of the plane. Scientific, government and military organizations are also using RC aircraft for experiments, gathering weather readings, aerodynamic modeling and testing and even using them as drones or spy planes.

There are many types of radio-controlled aircrafts. For beginning hobbyists, there are park flyers and trainers. For more experienced pilots there are glow plug engines, electric powered and sailplane aircrafts. For expert flyers, jets, pylon racers, helicopters, autogyros 3D aircraft and other high-end competition aircrafts provide adequate challenge. Some models are made to look and operate like a bird. A radio-controlled helicopter is a model aircraft, which is distinct from a RC airplane because of the differences in construction, aerodynamics and flight training. Several basic designs of RC helicopters exist, of which some (such as those with collective pitch control) are more maneuverable than others are. The more maneuverable designs are often harder to fly but benefit from greater aerobatic capabilities.

The various helicopter controls are effected by means of small servomotors, commonly known as servos. A solid-state gyroscope sensor is typically used on the tail rotor (yaw) control to counter wind- and torque-reaction-induced tail movement. Most new helicopters have gyro-stabilization on the other two axes of rotation (pitch and roll) as well. Such 3-axis gyro is typically called a flybarless controller so-called because it eliminates the need for a mechanical fly bar.

Common power sources of remote control helicopters are glow fuel (also called nitro fuel), electric batteries, gasoline (petrol) and turbine engines. For the first 40 years, glow fuel helicopters were the most common type produced. However, in the last 10 years, electric powered helicopters have matured to a point where power and flight times have equaled glow fuel helicopters.

Glow fuel, or nitro fuel helicopters (not to be confused with gas, or gasoline powered helicopters) have been made in several sizes over the years. These are referred to as the "class" of the helicopter. They include 1/2A class, 15 class, 30 class, 50 class, 60 class and 90 class. These class numbers originated from the size of engine (engine displacement measured in cubic inches) used in the different models. For example, a helicopter with a 0.30 cu in (4.9 cm³) engine is a 30 class and a helicopter with a 0.90 cu in (14.7 cm³) engine was referred to as a 90-class helicopter.

Two small electric helicopters emerged in the mid-1990s. These were the Kalt Whisper and the Kyosho EP Concept flying on 7–8 × 1.2 Ah NiCad batteries with brushed motors. However, the 540-sized brushed-motors were on the limit of current draw often 20–25 amps on the more powerful motors, hence, brush and commutator problems were common. Recent advancements in battery technology are making electric flying more feasible in terms of flying time. Lithium polymer batteries are able to provide the high

current required for high performance aerobatics while still remaining very light. Typical flight times are 4–12 minutes depending on the flying style and battery capacity.

A recent innovation is that of coaxial electric helicopters. The system simple direction control and freedom from torque-induced yaw have made it a good candidate on small models for beginner and/or indoor use. Models of this type, as in the case of a full-scale helicopter, eliminate rotational torque and can have extremely quick control response, both of which are very pronounced in a CCPM model. Cheaper models do not have a swash plate but instead use a third rotor on the tail to provide pitch control. These helicopters have no roll control and have limited mobility.

Construction of helicopters is typically of plastic, glass-reinforced plastic, aluminum or carbon fiber. Rotor blades are typically made of wood, fiberglass or carbon fiber. Models are typically purchased in kit form from one of about a dozen popular manufacturers and take 5 to 20 hours to completely assemble. These model helicopters contain many moving parts analogous to those on full-size helicopters. The construction of helicopters has to be more precise than for fixed-wing model aircraft because helicopters are susceptible to even the smallest of vibrations, which can cause problems when the helicopter is in flight.

While some companies make use of RC multicopters for low altitude aerial photography, filming, policing and remote observation or inspection, RC helicopters are not commonly used for commercial purposes. One notable exception is crop spraying with large RC helicopters such as the Yamaha R-MAX.

Miniature helicopters are remotely controlled helicopters with a weight ranging from just a few grams to one hundred grams. Most in production are toys aimed at hobbyists and enthusiasts. In addition, there are many companies making prototypes for military and security applications. Miniature helicopters are popular demonstrations for the latest technologies in miniaturization.

СПИСОК ВИКОРИСТАНОЇ ЛІТЕРАТУРИ / REFERENCES

1. Korner G. Electric Helicopters – New York : Sams Publishing, 2004. – 406 p.
2. "Academy of Model Aeronautics National Model Aircraft Safety Code". Academy of Model Aeronautics. – New York : Wiley, 2008. – 216 p.

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