The main differences between multicopters and fixed-wing aircraft or single rotor blade helicopters is in multicopters' special dynamic model and control effectiveness model.

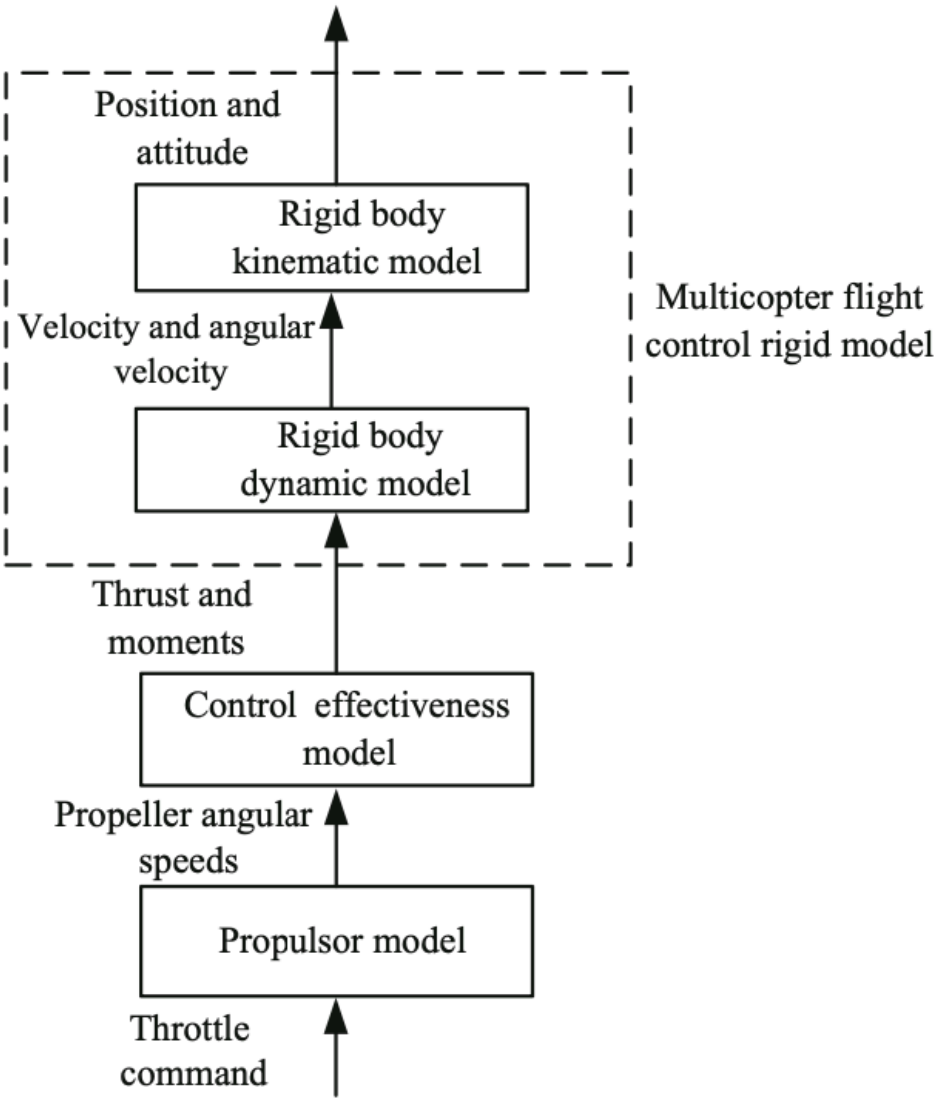
A traditional multicopter has four independent control inputs:

- thrust
- pitching moment
- rolling moment
- yawing moment

The thrust is always perpendicular to the multicopter fuselage plane and the propellers can generate thrust to lift the multicopter directly. The multicopter is thus simple and flexible in terms of control allocation.

How is the multicopter dynamic model established and how are the model parameters measured?

Multicopter control model



Mutlicopter modelling consists of four main parts:

1. Rigid-body kinematic model
2. Rigid-body dynamic model
3. Control effectiveness model
4. Propulsor model

Multicopter flight control rigid model

We assume:

- The multicopter is a rigid body
- The mass and moments of inertia are constant
- The geometric and centre of gravity of the multicopter are the same
- The multicopter is only under gravity and propeller thrust
- Gravity points along the positive direction in the $o_e z_e$ axis

- Propeller thrust points along the negative direction in the $o_b z_b$ axis
- Propellers with odd indices rotate counterclockwise and propellers with even indices rotate clockwise

The main difference between this model and other rigid-body dynamic models is that the thrust produced by the propellers is always perpendicular to the fuselage plane. In other words, the thrust direction is always consistent with the negative direction of the $o_b z_b$ axis.