

FUNC: Thrust and Power Required for GA Aircraft Propeller Driven

>>Details

(1) Description: This program uses predefined equations with provided coefficients to calculate the power for a certain general aviation propeller driven aircraft.

(2) Input values:

1. vel: free stream velocity [m/s] or [ft/s]

(3) Output values:

1. power: power [W]
2. thrust: thrust [N]

```
function [power, thrust] = GAprop_powerThrust_cal(vel)
% Preparations
mass = 1315; % Mass of the aircraft [kg]
wing_area = 16.3; % Wing surface area [m^3]
grav = 9.81; % Gravitational acceleration [m/s^2]
rho = 1.225; % Air density at sea level [kg/m^3]
C_D0 = 0.026; % Zero lift drag coefficient
K = 0.054; % Drag polar coefficient

% Calculate
% First calculate lift coefficient
C_L = 2 * mass * grav / rho ./ vel.^2 / wing_area;
% Then calculate the drag coefficient with drag polar
C_D = C_D0 + K .* C_L.^2;
% Thrust is approximated to be equal to drag
thrust = 0.5 * rho .* vel.^2 * wing_area .* C_D;
% Than power is the product of thrust and velocity
power = thrust .* vel;
end
```