

FUNC: POWER CALCULATOR (level flight)

>> Details

(1) Description: This program defines the equations for the lift and drag (level flight), and calculates them using the variables involved in the equation as inputs.

(2) Input values:

1. den: atmospheric density [kg/m³] or [slug/ft³]
2. vel: free stream velocity [m/s] or [ft/s]
3. area: wing area [m²] or [ft²]
4. D₀: lift zero drag coefficient
5. weight: the weight of the aircraft [N] or [lb]
6. AR: aspect ratio of the wing
7. e_o: the Oswald efficiency factor

(3) Output values:

1. P: power [W] or [lb-ft/s]
2. T: Thrust [N] or [lb]
3. drag coefficient
4. lift coefficient

```
function [power, thrust] = power_cal(rho, vel, wing_area, C_D0, weight, AR, e_o)
% Calculate the coefficients
K = 1 / pi / e_o / AR;
% Calculate
% First calculate lift coefficient
C_L = 2 * weight / 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;
% Then power is the product of thrust and velocity
power = thrust .* vel;
end
```