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Parameters Formulas

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List of 10 Parameters Formulas

Parameters

1) Average Blade Lift Coefficient

Open Calculator

fx $$C_l = 6 \cdot \frac{C_T}{\sigma}$$

ex $$50 = 6 \cdot \frac{0.5}{0.06}$$

2) Depth of Missile Penetration into Concrete Element of Infinite Thickness (meters)

Open Calculator

fx $$X = 12 \cdot K_p \cdot \frac{W_m}{A} \cdot \log 10\left(1 + \frac{V_s^2}{215000}\right)$$

ex $$28.98307\text{m} = 12 \cdot 0.7 \cdot \frac{1500\text{kg}}{20\text{m}^2} \cdot \log 10\left(1 + \frac{(155\text{m/s})^2}{215000}\right)$$

3) Disk Loading

Open Calculator

fx $$W_{load} = \frac{W_a}{\frac{\pi \cdot d_r}{4}}$$

ex $$25464.79\text{N} = \frac{1000\text{N}}{\frac{\pi \cdot 0.05\text{m}}{4}}$$

4) Helicopter Flying Range

Open Calculator

$$\mathrm{R} = 270 \cdot \frac{\mathrm{G_T}}{\mathrm{W_a}} \cdot \frac{\mathrm{C_L}}{\mathrm{C_D}} \cdot \eta_\mathrm{r} \cdot \frac{\xi}{\mathrm{c}}$$

ex $8.2\mathrm{E\hat{}6m} = 270 \cdot \frac{18000\mathrm{kg}}{1000\mathrm{N}} \cdot \frac{1.1}{30} \cdot 3.33 \cdot \frac{2.3}{0.6\mathrm{kg/h/W}}$

5) Maximum Blade Efficiency

Open Calculator

$$\eta\mathrm{bm} = \frac{2 \cdot \frac{\mathrm{F_l}}{\mathrm{F_d}} - 1}{2 \cdot \frac{\mathrm{F_l}}{\mathrm{F_d}} + 1}$$

ex $0.538462 = \frac{2 \cdot \frac{100\mathrm{N}}{60\mathrm{N}} - 1}{2 \cdot \frac{100\mathrm{N}}{60\mathrm{N}} + 1}$

6) Modern Lift Equation

Open Calculator

$$\mathrm{L} = \frac{\mathrm{C_L} \cdot \rho_{\mathrm{air}} \cdot \mathrm{S} \cdot \mathrm{u_f}}{2}$$

ex $185.955\mathrm{N} = \frac{1.1 \cdot 1.225\mathrm{kg/m^3} \cdot 23\mathrm{m^2} \cdot 12\mathrm{m/s}}{2}$

7) Orbital Period

Open Calculator

fx $$P = 2 \cdot \pi \cdot \sqrt{\frac{r_o^3}{[G.] \cdot M}}$$

ex $$0.076004\text{d} = 2 \cdot \pi \cdot \sqrt{\frac{(90000\text{m})^3}{[G.] \cdot 10000000000000000000\text{kg}}}$$

8) Rocket Mass Ratio

Open Calculator

fx $$MR = e^{\frac{\Delta V}{V_e}}$$

ex $$1.00962 = e^{\frac{18\text{m/s}}{1880\text{m/s}}}$$

9) Tsiolkovsky Rocket Equation

Open Calculator

fx $$\Delta V = I_{sp} \cdot [g] \cdot \ln\left(\frac{M_{wet}}{M_{dry}}\right)$$

ex $$17.87964\text{m/s} = 10\text{s} \cdot [g] \cdot \ln\left(\frac{30000\text{kg}}{25000\text{kg}}\right)$$

10) Weight of Glider

Open Calculator

fx $$W_g = F_L \cdot \cos(a) + F_D \cdot \sin(a)$$

ex $$63.99316\text{kg} = 10.5\text{N} \cdot \cos(45^\circ) + 80\text{N} \cdot \sin(45^\circ)$$

Variables Used

- **a** Glide Angle *(Degree)*
- **A** Frontal area of missile *(Square Meter)*
- **c** Specific Fuel Consumption *(Kilogram per Hour per Watt)*
- C_D Drag Coefficient
- C_l Blade lift coefficient
- C_L Lift Coefficient
- C_T Thrust Coefficient
- d_r Diameter of Rotor *(Meter)*
- F_d Blade Drag Force *(Newton)*
- F_D Drag Force *(Newton)*
- F_l Blade Lift Force *(Newton)*
- F_L Lift Force *(Newton)*
- G_T Weight of Fuel *(Kilogram)*
- I_{sp} Specific Impulse *(Second)*
- K_p Penetration Coefficient Concrete
- **L** Lift on Airfoil *(Newton)*
- **M** Central body Mass *(Kilogram)*
- M_{dry} Dry mass *(Kilogram)*
- M_{wet} Wet Mass *(Kilogram)*
- **MR** Rocket Mass Ratio
- **P** Orbital period *(Day)*
- **R** Range of Aircraft *(Meter)*

- r_o Radius of Orbit *(Meter)*
- S Aircraft Gross Wing Area *(Square Meter)*
- u_f Fluid Velocity *(Meter per Second)*
- V_e Rocket Exhaust Velocity *(Meter per Second)*
- V_s Missile striking velocity *(Meter per Second)*
- W_a Aircraft Weight *(Newton)*
- W_g Weight Of Glider *(Kilogram)*
- W_{load} Load *(Newton)*
- W_m Missile Wt. *(Kilogram)*
- X Missile depth of penetration *(Meter)*
- ΔV Change in Rocket Velocity *(Meter per Second)*
- η_r Rotor efficiency
- ηbm Maximum Blade efficiency
- ξ Coefficient of Power loss
- ρ_{air} Air Density *(Kilogram per Cubic Meter)*
- σ Rotor Solidity

Constants, Functions, Measurements used

- Constant: **pi**, 3.14159265358979323846264338327950288
  Archimedes' constant
- Constant: **[g]**, 9.80665 Meter/Second²
  Gravitational acceleration on Earth
- Constant: **[G.]**, 6.67408E-11 * Meter³/Kiogram Second²
  Gravitational constant
- Constant: **e**, 2.71828182845904523536028747135266249
  Napier's constant
- Function: **cos**, cos(Angle)
  Trigonometric cosine function
- Function: **ln**, ln(Number)
  Natural logarithm function (base e)
- Function: **log10**, log10(Number)
  Common logarithm function (base 10)
- Function: **sin**, sin(Angle)
  Trigonometric sine function
- Function: **sqrt**, sqrt(Number)
  Square root function
- Measurement: **Length** in Meter (m)
  Length Unit Conversion
- Measurement: **Weight** in Kilogram (kg)
  Weight Unit Conversion
- Measurement: **Time** in Day (d), Second (s)
  Time Unit Conversion
- Measurement: **Area** in Square Meter (m²)
  Area Unit Conversion

- Measurement: **Speed** in Meter per Second (m/s)
  Speed Unit Conversion
- Measurement: **Force** in Newton (N)
  Force Unit Conversion
- Measurement: **Angle** in Degree (°)
  Angle Unit Conversion
- Measurement: **Density** in Kilogram per Cubic Meter (kg/m³)
  Density Unit Conversion
- Measurement: **Specific Fuel Consumption** in Kilogram per Hour per Watt (kg/h/W)
  Specific Fuel Consumption Unit Conversion

Check other formula lists

- **Inviscid Compressible Flow Formulas**
- **Parameters Formulas**

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