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Electrostatic Parameters Formulas

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List of 14 Electrostatic Parameters Formulas

Electrostatic Parameters ↗

1) Angular Speed of Electron in Magnetic Field ↗

fx $\omega_e = \frac{[\text{Charge-e}] \cdot H}{[\text{Mass-e}]}$

[Open Calculator ↗](#)

ex $4E^{10}\text{rad/s} = \frac{[\text{Charge-e}] \cdot 0.23\text{A/m}}{[\text{Mass-e}]}$

2) Angular Speed of Particle in Magnetic Field ↗

fx $\omega_p = \frac{q_p \cdot H}{m_p}$

[Open Calculator ↗](#)

ex $4.6\text{rad/s} = \frac{4e-6\text{C} \cdot 0.23\text{A/m}}{2e-7\text{kg}}$

3) Diameter of Cycloid ↗

fx $D_c = 2 \cdot R$

[Open Calculator ↗](#)

ex $8E^{-6}\text{mm} = 2 \cdot 4e-9\text{m}$



4) Electric Field Intensity ↗

fx $E_{edc} = \frac{F}{q}$

[Open Calculator ↗](#)

ex $3.428571 \text{ V/m} = \frac{2.4 \text{ N}}{0.7 \text{ C}}$

5) Electric Flux ↗

fx $\Phi_E = E \cdot A \cdot \cos(\theta)$

[Open Calculator ↗](#)

ex $24.23962 \text{ C/m} = 3.428 \text{ V/m} \cdot 10 \text{ m}^2 \cdot \cos(45^\circ)$

6) Electric Flux Density ↗

fx $D = \frac{\Phi_E}{SA}$

[Open Calculator ↗](#)

ex $1.388889 \text{ C/m} = \frac{25 \text{ C/m}}{18 \text{ m}^2}$

7) Electrostatic Deflection Sensitivity ↗

fx $S_e = \frac{L_{def} \cdot L_{crt}}{2 \cdot d \cdot V_a}$

[Open Calculator ↗](#)

ex $0.001333 \text{ m/V} = \frac{50 \text{ m} \cdot 0.012 \text{ mm}}{2 \cdot 2.5 \text{ mm} \cdot 90 \text{ V}}$



8) Hall Voltage ↗

fx $V_h = \left(\frac{H \cdot I}{RH \cdot W} \right)$

[Open Calculator ↗](#)

ex $0.851852V = \left(\frac{0.23A/m \cdot 2.2A}{6 \cdot 99mm} \right)$

9) Magnetic Deflection Sensitivity ↗

fx $S_m = (L_{def} \cdot L_{crt}) \cdot \sqrt{\left(\frac{[Charge-e]}{2 \cdot [Mass-e] \cdot V_a} \right)}$

[Open Calculator ↗](#)

ex $18.75537m/V = (50m \cdot 0.012mm) \cdot \sqrt{\left(\frac{[Charge-e]}{2 \cdot [Mass-e] \cdot 90V} \right)}$

10) Magnetic Field Intensity ↗

fx $H = \frac{1}{2 \cdot \pi \cdot d_{wire}}$

[Open Calculator ↗](#)

ex $0.234051A/m = \frac{50m}{2 \cdot \pi \cdot 34m}$



11) Particle Acceleration

fx $a_p = \frac{[\text{Charge-e}] \cdot E}{[\text{Mass-e}]}$

[Open Calculator !\[\]\(e2376d476d06eb31946dc01a69a4403a_img.jpg\)](#)

ex $602923.5 \text{ m/ms}^2 = \frac{[\text{Charge-e}] \cdot 3.428 \text{ V/m}}{[\text{Mass-e}]}$

12) Path Length of Particle in Cycloidal Plane

fx $R = \frac{V_{ef}}{\omega_e}$

[Open Calculator !\[\]\(0b5e7e25e8775f7e7e80906ada4f0021_img.jpg\)](#)

ex $4E^{-9} \text{ m} = \frac{160.869 \text{ m/s}}{4e10 \text{ rad/s}}$

13) Radius of Electron on Circular Path

fx $r_e = \frac{[\text{Mass-e}] \cdot V_e}{H \cdot [\text{Charge-e}]}$

[Open Calculator !\[\]\(bd3b31712ad9bab5a241210fa6925cdd_img.jpg\)](#)

ex $0.012397 \text{ mm} = \frac{[\text{Mass-e}] \cdot 501509 \text{ m/s}}{0.23 \text{ A/m} \cdot [\text{Charge-e}]}$

14) Transition Capacitance

fx $C_T = \frac{[\text{Permitivity-vacuum}] \cdot A_{jp}}{W_d}$

[Open Calculator !\[\]\(7bc43b319a082987e20f7bf78f4bab80_img.jpg\)](#)

ex $7.643182 \text{ pF} = \frac{[\text{Permitivity-vacuum}] \cdot 0.019 \text{ m}^2}{22 \text{ mm}}$



Variables Used

- **A** Area of Surface (Square Meter)
- **A_{jp}** Junction Plate Area (Square Meter)
- **a_p** Particle Acceleration (Meter Per Square Millisecond)
- **C_T** Transition Capacitance (Picofarad)
- **d** Distance between Deflecting Plates (Millimeter)
- **D** Electric Flux Density (Coulomb per Meter)
- **D_c** Diameter of Cycloid (Millimeter)
- **d_{wire}** Distance from Wire (Meter)
- **E** Electric Field Intensity (Volt per Meter)
- **E_{edc}** Electric Field Intensity (Volt per Meter)
- **F** Electric Force (Newton)
- **H** Magnetic Field Strength (Ampere per Meter)
- **I** Electric Current (Ampere)
- **l** Length of Wire (Meter)
- **L_{crt}** Cathode Ray Tube Length (Millimeter)
- **L_{def}** Length of Deflecting Plates (Meter)
- **m_p** Particle Mass (Kilogram)
- **q** Electric Charge (Coulomb)
- **q_p** Particle Charge (Coulomb)
- **R** Particle Cycloidal Path (Meter)
- **r_e** Radius of Electron (Millimeter)
- **RH** Hall Coefficient



- S_e Electrostatic Deflection Sensitivity (*Meter per Volt*)
- S_m Magnetic Deflection Sensitivity (*Meter per Volt*)
- SA Surface Area (*Square Meter*)
- V_a Anode Voltage (*Volt*)
- V_e Electron Velocity (*Meter per Second*)
- V_{ef} Velocity of Electron in Force Fields (*Meter per Second*)
- V_h Hall Voltage (*Volt*)
- W Width of Semiconductor (*Millimeter*)
- W_d Width of Depletion Region (*Millimeter*)
- θ Angle (*Degree*)
- Φ_E Electric Flux (*Coulomb per Meter*)
- ω_e Angular Speed of Electron (*Radian per Second*)
- ω_p Angular Speed of Particle (*Radian per Second*)



Constants, Functions, Measurements used

- **Constant:** **pi**, 3.14159265358979323846264338327950288
Archimedes' constant
- **Constant:** **[Charge-e]**, 1.60217662E-19 Coulomb
Charge of electron
- **Constant:** **[Mass-e]**, 9.10938356E-31 Kilogram
Mass of electron
- **Constant:** **[Permitivity-vacuum]**, 8.85E-12 Farad / Meter
Permittivity of vacuum
- **Function:** **cos**, cos(Angle)
Trigonometric cosine function
- **Function:** **sqrt**, sqrt(Number)
Square root function
- **Measurement:** **Length** in Millimeter (mm), Meter (m)
Length Unit Conversion 
- **Measurement:** **Weight** in Kilogram (kg)
Weight Unit Conversion 
- **Measurement:** **Electric Current** in Ampere (A)
Electric Current Unit Conversion 
- **Measurement:** **Area** in Square Meter (m^2)
Area Unit Conversion 
- **Measurement:** **Speed** in Meter per Second (m/s)
Speed Unit Conversion 
- **Measurement:** **Acceleration** in Meter Per Square Millisecond (m/ms^2)
Acceleration Unit Conversion 
- **Measurement:** **Electric Charge** in Coulomb (C)
Electric Charge Unit Conversion 



- **Measurement:** Force in Newton (N)
Force Unit Conversion 
- **Measurement:** Angle in Degree ($^{\circ}$)
Angle Unit Conversion 
- **Measurement:** Capacitance in Picofarad (pF)
Capacitance Unit Conversion 
- **Measurement:** Magnetic Field Strength in Ampere per Meter (A/m)
Magnetic Field Strength Unit Conversion 
- **Measurement:** Linear Charge Density in Coulomb per Meter (C/m)
Linear Charge Density Unit Conversion 
- **Measurement:** Electric Field Strength in Volt per Meter (V/m)
Electric Field Strength Unit Conversion 
- **Measurement:** Electric Potential in Volt (V)
Electric Potential Unit Conversion 
- **Measurement:** Angular Velocity in Radian per Second (rad/s)
Angular Velocity Unit Conversion 
- **Measurement:** Deflection Sensitivity in Meter per Volt (m/V)
Deflection Sensitivity Unit Conversion 



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