Important Electrostatic Parameters Formulas PDF

Formulas
Examples
with Units

List of 14
Important Electrostatic Parameters Formulas

1) Angular Speed of Electron in Magnetic Field Formula

Evaluate Formula

Formula

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

Example with Units

$$4\text{E+10}\,\text{rad/s} = \frac{1.6\text{E-19}\,\text{C} \cdot 0.23\,\text{A/m}}{9.1\text{E-31}\,\text{kg}}$$

2) Angular Speed of Particle in Magnetic Field Formula

Evaluate Formula

Formula

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

Example with Units

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

3) Diameter of Cycloid Formula

Evaluate Formula

Formula

$$D_c = 2 \cdot R$$

Example with Units

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

4) Electric Field Intensity Formula

Evaluate Formula

Formula

$$E = \frac{F}{q}$$

Example with Units

$$600\,\text{V/m} = \frac{2.4\,\text{N}}{0.004\,\text{C}}$$

5) Electric Flux Formula

Evaluate Formula

Formula

$$\Phi_E = E_I \cdot A \cdot \cos(\theta)$$

Example with Units

$$24.2396\,\text{C/m} = 3.428\,\text{V/m} \cdot 10\,\text{m}^2 \cdot \cos(45°)$$

6) Electric Flux Density Formula

Evaluate Formula

Formula

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

Example with Units

$$1.3889\,\text{C/m} = \frac{25\,\text{C/m}}{18\,\text{m}^2}$$

7) Electrostatic Deflection Sensitivity Formula

Evaluate Formula

Formula

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

Example with Units

$$0.0013\,\text{m/V} = \frac{50\,\text{m} \cdot 0.012\,\text{mm}}{2 \cdot 2.5\,\text{mm} \cdot 90\,\text{V}}$$

8) Hall Voltage Formula

Evaluate Formula

Formula

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

Example with Units

$$0.8519\,\text{V} = \left(\frac{0.23\,\text{A/m} \cdot 2.2\,\text{A}}{6 \cdot 99\,\text{mm}} \right)$$

9) Magnetic Deflection Sensitivity Formula

Evaluate Formula

Formula

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

Example with Units

$$18.7554\,\text{m/V} = \left(50\,\text{m} \cdot 0.012\,\text{mm} \right) \cdot \sqrt{\left(\frac{1.6E\text{-}19\,\text{C}}{2 \cdot 9.1E\text{-}31\,\text{kg} \cdot 90\,\text{V}} \right)}$$

10) Magnetic Field Intensity Formula

Evaluate Formula

Formula

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

Example with Units

$$0.2341\,\text{A/m} = \frac{50\,\text{m}}{2 \cdot 3.1416 \cdot 34\,\text{m}}$$

11) Particle Acceleration Formula

Evaluate Formula

Formula

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

Example with Units

$$602923.5038\,\text{m/ms}^2 = \frac{1.6E\text{-}19\,\text{C} \cdot 3.428\,\text{V/m}}{9.1E\text{-}31\,\text{kg}}$$

12) Path Length of Particle in Cycloidal Plane Formula

Evaluate Formula

Formula

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

Example with Units

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

13) Radius of Electron on Circular Path Formula

Evaluate Formula

Formula

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

Example with Units

$$0.0124\,\text{mm} = \frac{9.1\text{E-}31\,\text{kg} \cdot 501509\,\text{m/s}}{0.23\,\text{A/m} \cdot 1.6\text{E-}19\,\text{C}}$$

14) Transition Capacitance Formula

Evaluate Formula

Formula

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

Example with Units

$$7.6432\,\text{pF} = \frac{8.9\text{E-}12\,\text{F/m} \cdot 0.019\,\text{m}^2}{22\,\text{mm}}$$

Variables used in list of Electrostatic Parameters Formulas above

- **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 *(Volt per Meter)*
- E_l 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)*

Constants, Functions, Measurements used in list of Electrostatic Parameters Formulas above

- constant(s): **pi**, 3.14159265358979323846264338327950288 *Archimedes' constant*
- constant(s): **[Charge-e]**, 1.60217662E-19 *Charge of electron*
- constant(s): **[Mass-e]**, 9.10938356E-31 *Mass of electron*
- constant(s): **[Permitivity-vacuum]**, 8.85E-12 *Permittivity of vacuum*
- Functions: **cos**, cos(Angle) *Cosine of an angle is the ratio of the side adjacent to the angle to the hypotenuse of the triangle.*
- Functions: **sqrt**, sqrt(Number) *A square root function is a function that takes a non-negative number as an input and returns the square root of the given input number.*
- 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 (m²) *Area Unit Conversion*
- Measurement: **Speed** in Meter per Second (m/s) *Speed Unit Conversion*
- Measurement: **Acceleration** in Meter Per Square Millisecond (m/ms²) *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 (°) *Angle Unit Conversion*
- Measurement: **Capacitance** in Picofarad (pF) *Capacitance Unit Conversion*

- 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)*

- 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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