Physics

JZL1001913C

summer semester
2020/2021

Wednesday, 18:20 - 19:50

Friday, 18:20 - 19:50

virtual room (ZOOM)

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room 213, building L-1

Outline

- Introduction - Physics rules the world
- Motion phenomena - Kinematics
- Motion phenomena - Dynamics
- Rotational motion
- Harmonic motion
- Gravitational field
- Relativistic phenomena
- Basics of Thermodynamics
- Principles of Thermodynamics
- Fluids Statics
- **Electrostatics**
- **Electric current**
- **Magnetic field**
- **Vibrations and electromagnetic waves**

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Electrostatics
- short rewiev

Quantities:
- Electric charge
- Electric field
- Electric potential
- Electric potential energy

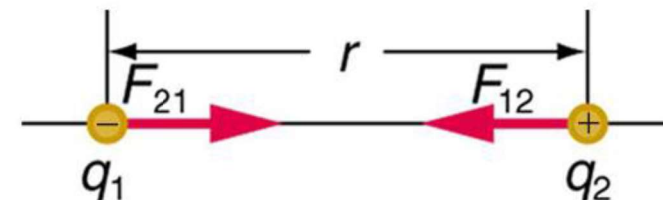| Charge	Unit
	1 kg/m/s^2 = 1 C = 1 Coulomb
Electric field $E = k\dfrac{|Q|}{r^2}$	Unit 1N/C = 1 V/m = 1 Volt/metr
Electric potential energy $E_p = Fr = k\dfrac{q_1 q_2}{r}$	Unit 1J

Coulomb's law

$$F = k\frac{q_1 q_2}{r^2}$$

$$k = 8.988 \times 10^9 \frac{\text{N} \cdot \text{m}^2}{\text{C}^2} \approx 8.99 \times 10^9 \frac{\text{N} \cdot \text{m}^2}{\text{C}^2}$$

(a) F_{21} ← r → F_{12}, q_1 (−), q_2 (−)

(b) F_{21} ← r → F_{12}, q_1 (−), q_2 (+)
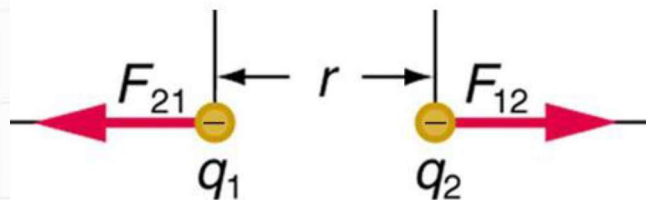
Electric current
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Electric current $I = \dfrac{Q}{t}$	Unit 1 A/s = 1 A = 1 Ampere
Resistance R = U/I	Unit 1V/A = 1 Ohm = 1Ω
Resistivity ρ = RA/l	Unit 1Ωm²/m = 1 Ohm * m = 1Ωm
Electric power P = UI	Unit 1V*A = 1 Watt = 1 W

Quantities:
- Electric current
- Resistance
- Resistivity
- Electric power
- AC and DC

Ohm's law

$$R = \dfrac{U}{I}$$

Magnetism
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Magnetic field $B = \dfrac{F}{qvsin\theta}$	Unit 1 Tesla = 1T = 1N/(A*m)
Magnetic Flux $\Phi = BAcos\theta$	Unit 1 Weber = 1 Wb
Magnetic Permeability $\mu = B/H$	**Unit** 1Wb/(A*m)

Quantities:
- Magnetic field
- Magnetic Flux
- Magnetic Permeability

The Lorentz force:
$$F = Bqvsin\theta$$

Electromagnetic Waves

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wavelength $\lambda = \dfrac{c}{f}$	Unit 1 m = 1 meter
frequency f	Unit 1 Hz = 1 Herz

Quantities:
- wavelength
- frequency

Maxwell's laws:
1) Gauss's law (electricity)
2) Gauss's law (magnetism)
3) Faraday's law
4) Ampere's law

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