ECE 2300
Recitation Class 4

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Pre-class

- Quiz this week!
  - After Thursday lecture (8:00 pm – 8:40 pm)
  - Same format as last quiz. Online student need to turn on at least one camara.
  - If you want to take online quiz, notify us beforehand!

- Midterm 1 next week!
  - Location to be announced
  - Thursday June 15th 7-8:40 pm
  - Arrange your time well!

4.1.1 Recap - Conductors

- Definition:

- Static state characteristics:
  - Inside:
  - Surface(Boundary):
  - Outside:

4.1.2 Recap – Dielectrics

- Definition:

- Polarization Vector:
  - Defined by dipole density:

4.1.2 Recap – Dielectrics

- Surface charge density:

- Volume charge density:

4.2.1 Electric Flux Density/Electric Displacement

- Definition:

- Expression:
  - Relation with E and P:

4.2.1 Electric Flux Density/Electric Displacement

- Integration Form:

- Differential Form:

4.2.2 Electric Displacement in Isotropic Medium

- Relation between Polarization Vector and Field:

4.2.3 Electric Dis. for anisotropic Medium

- General anisotropic medium

- Biaxial:

4.3 Boundary Conditions

- Normal:

4.3 Boundary Conditions

- Tangential:

4.4.1 Capacitors

- Definition:

- Equation for description:
  - General Form:

  - *Related to only surface area & distance:

4.4.2 Find Capacitance

- Step1:
- Step2:
- Step3:
- Step4:

4.4.3 Connected Capacitors

- Series Connection:

- Parallel Connection:

Ex.1 Electric Displacement

Suppose we have a capacitor with capacitance of C, what is the capacitance C’ after we inserted a dielectric with relative permittivity of εr?

Ex.1 Electric Displacement

Suppose we have a capacitor with capacitance of C, what is the capacitance C’ after we inserted a dielectric with relative permittivity of εr?

4.5 Energy of Electric Field

- For discrete charges:

  *why ½?

- For continuous charges:

4.5 Energy of Electric Field (Some Eq.s)

4.6 Method of Image Charge

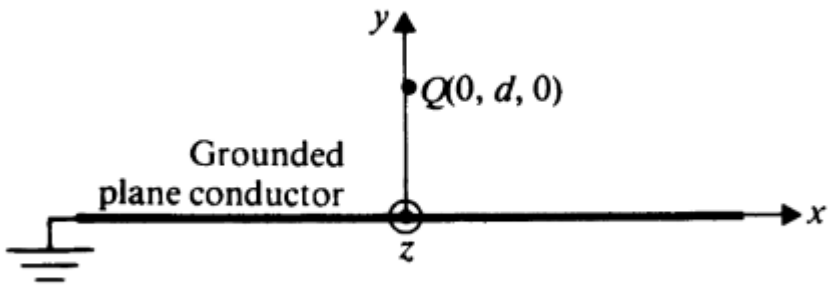
- Key Point:

4.6 Method of Image Charge

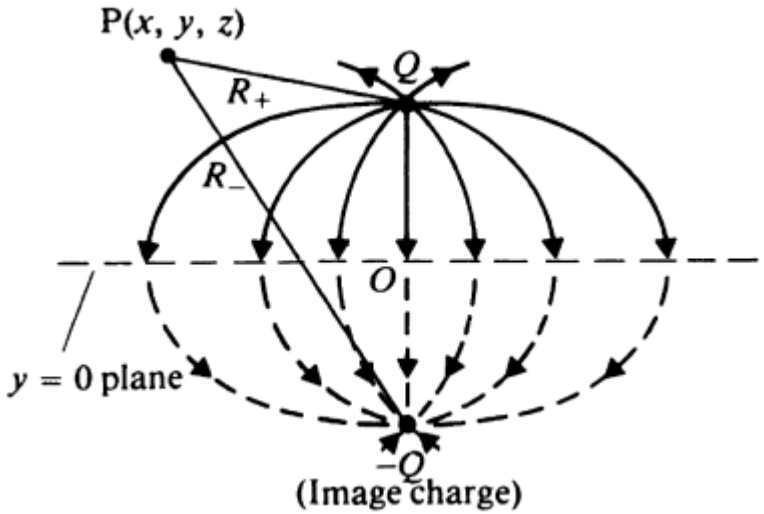
- Why legal?
  - Uniqueness Theorem!

4.6 Method of Image Charge

- Examples:
  - Point charge and a conducting plane

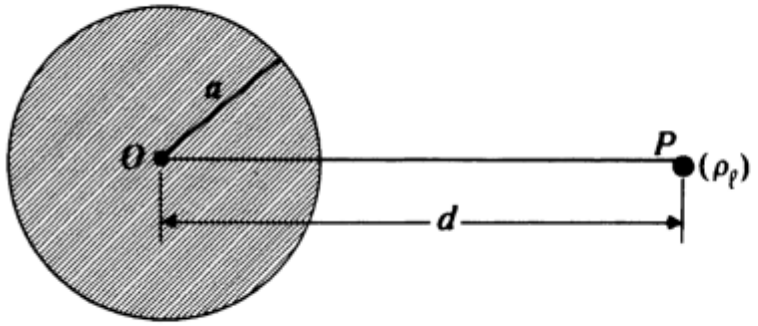


(a) Physical arrangement.

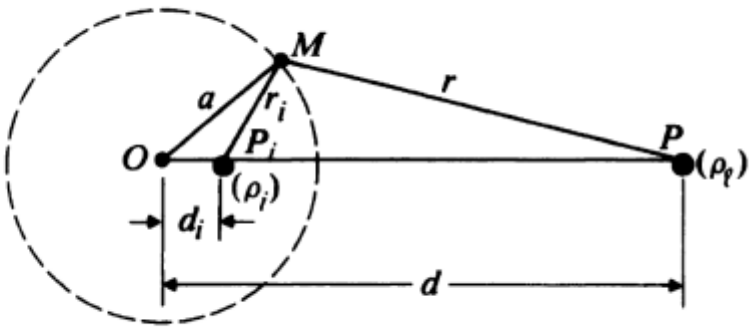


4.6 Method of Image Charge

- Examples:
  - Line charge and a parallel conducting cylinder



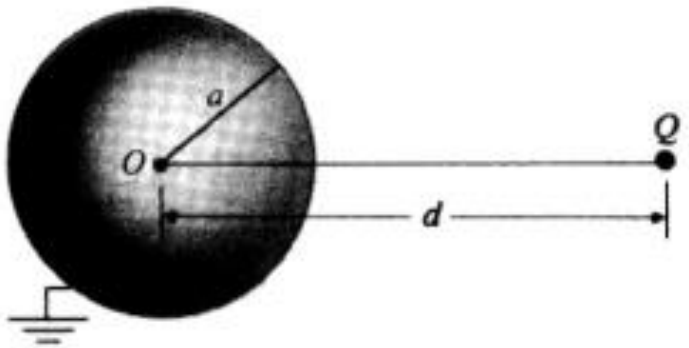
(a) Line charge and parallel conducting cylinder.



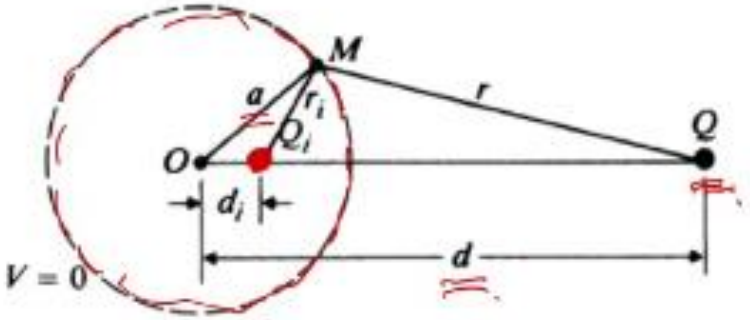
(b) Line charge and its image.

4.6 Method of Image Charge

- Examples:
  - Point charge and a conducting sphere

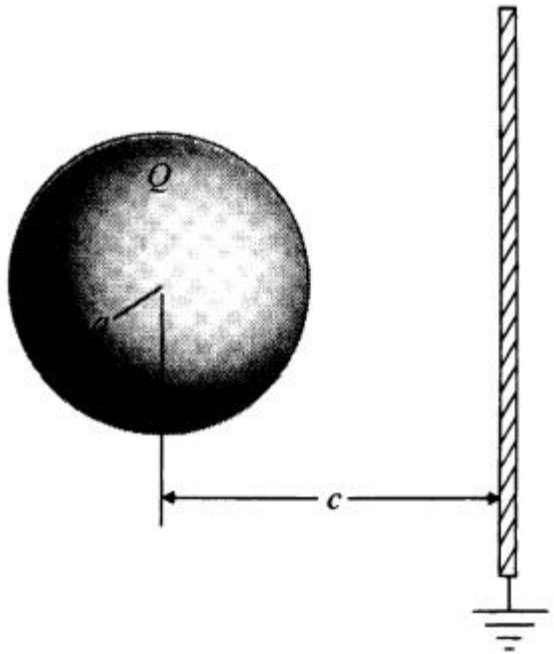


(a) Point charge and grounded conducting sphere.



(b) Point charge and its image.

Ex.2 Method of Image Charge



(a) Physical arrangement.

Thank You

Credit to Deng Naihao for this slides & information