"The Fundamentals of Electromagnetic Theory"
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Chapter 6 Capacitance

Computer Assisted Instruction

Interactive Examples

Example 6.1

Capacitance of a parallel capacitor. A parallel plate capacitor consists of two metal disks, 5.00 cm in radius. The disks are separated by air and are a distance of 4.00 mm apart. A potential of 50.0 V is applied across the plates by a battery. Find (a) the capacitance C of the capacitor and (b) the charge q on the plate.

Initial Conditions

r =	5.00	cm	=	0.05	m	V =	50.00 V
d =	4.00	mm	=	0.004	m	ε_o =	8.85E-12 $(C^2)/(N\ m^2)$

Solution

a. The area of the plate is

$$A = \pi r^2$$

$$A = (\ 3.14\ )\ x\ (\ 5.00E\text{-}02\ m)^2$$

$$A = 7.85E\text{-}03\ m^2$$

The capacitance, found from equation 6.14, is

$$C = \varepsilon_o A / d$$

$$C = (\ 8.85E\text{-}12\ C^2)/(N\ m^2))x(\ 7.85E\text{-}03\ m^2)\ /\ (\ 0.004\ m)$$

$$C = 1.74E\text{-}11\ F$$

b. The charge on the plate is determined from equation 6.15 as

$$q = C V$$

$$q = (\ 1.74E\text{-}11\ F\ )\ x\ (\ 50.00\ V\ )$$

$$q = 8.69E\text{-}10\ C$$

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