Area = 10 cm²
ε = 4ε₀

\[ V = 20 \cos 2\pi x \times 10^6 \, \text{x} \]

Find the displacement current.

The loop rotates at 6000 RPM in a uniform field
\[ B = 50 \, \text{mT} \hat{z} \]
Find the EMF.
Find EMF in the coil for:

(a) $B = 10e^{-2t} \hat{z}$

(b) $B = 10 \cos x \cos 10^3 t \hat{z}$

(c) $B = 10 \cos x \sin 2y \cos 10^3 t \hat{z}$
\[ \Delta I = I_0 \cos \omega t \]

- **a)** Find an expression for \( V \).
- **b)** \( I_0 = 50 \), \( f = 60 \text{ Hz} \), \( \mu r = 4000 \), \( a = 5 \text{ cm} \), \( b = 6 \text{ cm} \), \( c = 2 \text{ cm} \). Evaluate \( V \).
The switch is closed at \( t=0 \). After steady state it is reopened. What is the direction of current in loop 1 just after each switching operation.

A circular TV antenna with area 0.01 m\(^2\) is in a uniform 300 MHz signal. The maximum voltage obtained is 20 mV. What is the peak B?
a) find an expression for \( J_c \)
b) find an expression for \( J_d \)
c) draw an equivalent circuit

d) \( A = 2 \text{ cm}^2, \ d = 0.5 \text{ cm}, \ \varepsilon_r = 4, \mu_0 = 2.5 \times 10^5 \text{ S/m} \)
\( V(t) = 10 \cos(3\pi \times 10^3 t) \text{ V} \). Evaluate \( J_c, J_d \).
A 50 cm long metal bar rotates at 180 rpm with 1 end fixed at the origin. \( B = 3 \times 10^{-4} \ T \) \( \hat{z} \).

Find the EMF.

\[ i(t) = 2.5 \cos 2\pi \times 10^4 t \ A \]

Find the EMF.
An EM wave is propagating in sea water ($\varepsilon_r = 81$, $\sigma = 45$ S/m) and is $E = E_0 \cos \omega t \hat{z}$. Find the ratios of conduction to displacement current density at 1 kHz, 1 MHz, 1 GHz, 100 GHz.

$$\frac{|J_c|}{|J_d|} = ?$$