$A = 100cm^2 = 10000mm^2$

$\epsilon = 1$

$d(t) = 1 + 0.01\sin(200t)mm$

$$C = \frac{\epsilon A}{d} = \frac{10000mm^2}{1+0.01\sin(200t)mm}$$

$V = 200V$

~~$i(t) = C\frac{dv}{dt}$~~

$$i_c = \frac{dQ_c}{dt} = \frac{d(C(t)V_c)}{dt}$$

$$i_c = V_c\frac{dC}{dt}$$

V

$$200 = \frac{1}{C}\int i(t)dt$$

$$200C = \int_{t_0}^{t} i(t)dt$$

$$= \int C\frac{dv}{dt}dt$$

$$200C = \int C\,dV$$

$$C = \frac{\epsilon A}{1+.01\sin(200t)} = (\epsilon A)\frac{1}{1+.01\sin(200t)}$$

assum $t \ll 1$, so

$$\frac{1}{1+0.01\sin(200t)} = \frac{1}{1+.01\sin(200t)} = 1-.01\sin 200t$$

$$C = \epsilon A(1-.01\sin 200t)$$

$$i_c = V_c\epsilon A\frac{d}{dt}(1-.01\sin 200t)\frac{1}{m}$$

$$i_c = V_c\epsilon A(-2\cos 200t)$$

$$= 200V(1\tfrac{F}{m})(10000mm^2)(\quad$$

$$= 200V(1\tfrac{F}{m})(.01m^2)(1E^{-2})(-2\cos 200t)\frac{1}{m}$$

$$i_c = -.004\cos(200t)$$