

30. Let the area plate be A and the plate separation be d . We use Eq. 32-34:

$$i_d = \varepsilon_0 \frac{d\Phi_E}{dt} = \varepsilon_0 \frac{d}{dt}(AE) = \varepsilon_0 A \frac{d}{dt} \left(\frac{V}{d} \right) = \frac{\varepsilon_0 A}{d} \left(\frac{dV}{dt} \right) ,$$

or

$$\frac{dV}{dt} = \frac{i_d d}{\varepsilon_0 A} = \frac{i_d}{C} = \frac{1.5 \text{ A}}{2.0 \times 10^{-6} \text{ F}} = 7.5 \times 10^5 \text{ V/s} .$$

Therefore, we need to change the voltage difference across the capacitor at the rate of $7.5 \times 10^5 \text{ V/s}$.