

54. (a) Since the field is decreasing, the displacement current (by Eq. 32-38) is downward, which produces (by the right-hand rule) a clockwise sense for the induced magnetic field.
- (b) See the solution for part (a).
- (c) and (d) We write $\vec{E} = E_z \hat{k} = (E_0 - \xi t) \hat{k}$ where $\xi = 60000(\text{V/m})/\text{s}$. From Eq. 32-36 (treated in absolute value)

$$i_d = \varepsilon_0 A \left| \frac{dE_z}{dt} \right| = \varepsilon_0 A \xi$$

which yields $i_d = 2.1 \times 10^{-8} \text{ A}$ for all values of t .