

42. During periods of time when the current is varying linearly with time, Eq. 31-37 (in absolute values) becomes $|\mathcal{E}| = L \left| \frac{\Delta i}{\Delta t} \right|$. For simplicity, we omit the absolute value signs in the following.

- (a) For $0 < t < 2 \text{ ms}$

$$\mathcal{E} = L \frac{\Delta i}{\Delta t} = \frac{(4.6 \text{ H})(7.0 \text{ A} - 0)}{2.0 \times 10^{-3} \text{ s}} = 1.6 \times 10^4 \text{ V} .$$

- (b) For $2 \text{ ms} < t < 5 \text{ ms}$

$$\mathcal{E} = L \frac{\Delta i}{\Delta t} = \frac{(4.6 \text{ H})(5.0 \text{ A} - 7.0 \text{ A})}{(5.0 - 2.0)10^{-3} \text{ s}} = 3.1 \times 10^3 \text{ V} .$$

- (c) For $5 \text{ ms} < t < 6 \text{ ms}$

$$\mathcal{E} = L \frac{\Delta i}{\Delta t} = \frac{(4.6 \text{ H})(0 - 5.0 \text{ A})}{(6.0 - 5.0)10^{-3} \text{ s}} = 2.3 \times 10^4 \text{ V} .$$