

Chapter 6, Solution 39

The voltage across a 200-mH inductor is given by

$$v(t) = [3t^2 + 2t + 4] \text{ V for } t > 0.$$

Determine the current $i(t)$ through the inductor. Assume that $i(0) = 1 \text{ A}$.

Solution

$$v = L \frac{di}{dt} \longrightarrow i = \frac{1}{L} \int_0^t v dt + i(0)$$

$$i = \frac{1}{200 \times 10^{-3}} \int_0^t (3t^2 + 2t + 4) dt + 1$$

$$= 5(t^3 + t^2 + 4t) \Big|_0^t + 1$$

$$i(t) = [5t^3 + 5t^2 + 20t + 1] \text{ A}$$