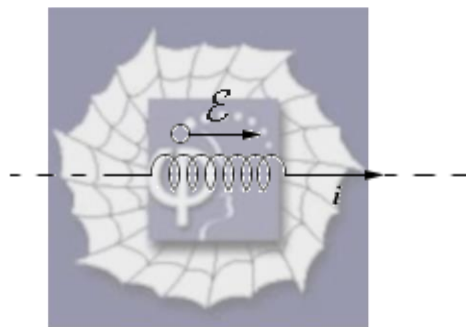


518.

Problem 38.4 (RHK)

At a given instant the current and the induced emf in an inductor are as indicated in the figure. (a) We have to answer whether the current is increasing or decreasing; and (b) if the emf is 17 V, and if the rate of change of the current is 25 kA s^{-1} we have to find the value of the inductance.



Solution:

We note the direction of the emf due to inductance. As it will add to the flow of the current in the circuit, by Lenz' law the current is decreasing.

The rate of change of current,

$$\frac{di}{dt} = 20 \times 10^3 \text{ A s}^{-1}.$$

The emf across the inductance is

$$E = 17 \text{ V}.$$

Therefore, the value of the inductance in the circuit is

$$L = \frac{E}{\frac{di}{dt}} = \frac{17}{20 \times 10^3} \text{ H} = 0.85 \text{ mH.}$$

