

Selon la loi d'additivité des tension on a
 $u_L + u_R = E$

$$L \frac{di}{dt} + r.i + R.i = E$$

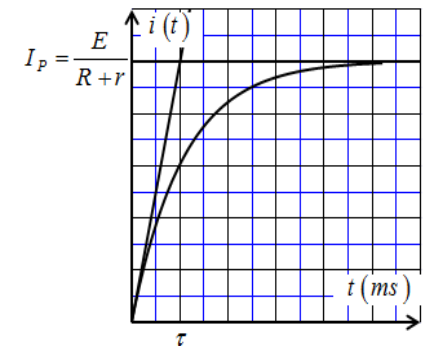
$$L \frac{di}{dt} + (r+R).i = E$$

$$\frac{L}{r+R} \frac{di}{dt} + i = \frac{E}{r+R}$$

$$i(t) = A \left(1 - e^{-\frac{t}{\tau}} \right) \Leftrightarrow i(t) = A - A e^{-\frac{t}{\tau}} \Leftrightarrow \frac{di}{dt} = \frac{A}{\tau} e^{-\frac{t}{\tau}}$$

$$\frac{L}{R+r} \left(\frac{A}{\tau} e^{-\frac{t}{\tau}} \right) + A - A e^{-\frac{t}{\tau}} = \frac{E}{R+r}$$

$$A e^{-\frac{t}{\tau}} \left(\frac{L}{R+r} \frac{1}{\tau} - 1 \right) = \frac{E}{R+r} - A \Leftrightarrow \begin{cases} \tau = \frac{L}{R+r} \\ A = \frac{E}{R+r} \end{cases}$$



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$$L \frac{di}{dt} + r.i + R.i = E \Leftrightarrow L \frac{di}{dt} + (r+R).i = E$$

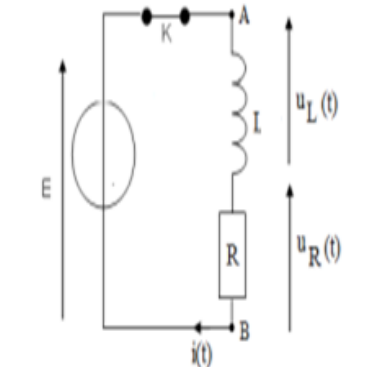
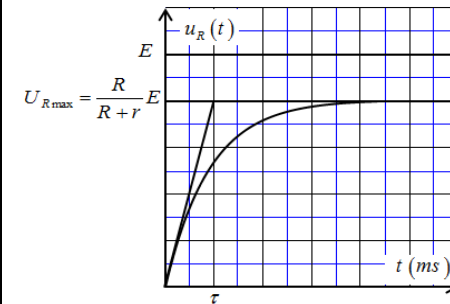
$$\frac{L}{r+R} \frac{di}{dt} + i = \frac{E}{r+R} \Leftrightarrow \frac{L}{r+R} \frac{d(Ri)}{dt} + (R.i) = \frac{RE}{r+R}$$

$$\frac{L}{r+R} \frac{du_R}{dt} + u_R = \frac{RE}{r+R}$$

$$u_R(t) = A \left(1 - e^{-\frac{t}{\tau}} \right) \Leftrightarrow u_R(t) = A - A e^{-\frac{t}{\tau}} \Leftrightarrow \frac{du_R(t)}{dt} = \frac{A}{\tau} e^{-\frac{t}{\tau}}$$

$$\frac{L}{R+r} \left(\frac{A}{\tau} e^{-\frac{t}{\tau}} \right) + A - A e^{-\frac{t}{\tau}} = \frac{RE}{R+r}$$

$$A e^{-\frac{t}{\tau}} \left(\frac{L}{R+r} \frac{1}{\tau} - 1 \right) = \frac{RE}{R+r} - A \Leftrightarrow \begin{cases} \tau = \frac{L}{R+r} \\ A = \frac{RE}{R+r} \end{cases}$$



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$$L \frac{di}{dt} + R.i = E$$

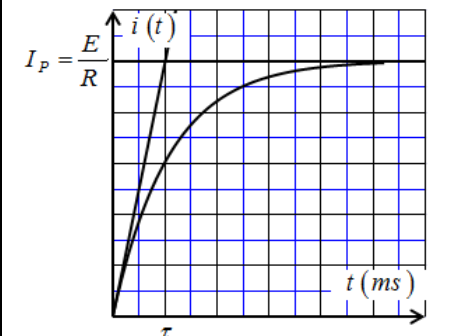
$$L \frac{di}{dt} + R.i = E$$

$$\frac{L}{R} \frac{di}{dt} + i = \frac{E}{R}$$

$$i(t) = A \left(1 - e^{-\frac{t}{\tau}} \right) \Leftrightarrow i(t) = A - A e^{-\frac{t}{\tau}} \Leftrightarrow \frac{di}{dt} = \frac{A}{\tau} e^{-\frac{t}{\tau}}$$

$$\frac{L}{R} \left(\frac{A}{\tau} e^{-\frac{t}{\tau}} \right) + A - A e^{-\frac{t}{\tau}} = \frac{E}{R}$$

$$A e^{-\frac{t}{\tau}} \left(\frac{L}{R} \frac{1}{\tau} - 1 \right) = \frac{E}{R} - A \Leftrightarrow \begin{cases} \tau = \frac{L}{R} \\ A = \frac{E}{R} \end{cases}$$



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$$L \frac{di}{dt} + R.i = E \Leftrightarrow L \frac{di}{dt} + R.i = E$$

$$\frac{L}{R} \frac{di}{dt} + i = \frac{E}{R} \Leftrightarrow \frac{L}{R} \frac{d(Ri)}{dt} + (R.i) = \frac{RE}{R}$$

$$\frac{L}{R} \frac{du_R}{dt} + u_R = E$$

$$u_R(t) = A \left(1 - e^{-\frac{t}{\tau}} \right) \Leftrightarrow u_R(t) = A - A e^{-\frac{t}{\tau}} \Leftrightarrow \frac{du_R(t)}{dt} = \frac{A}{\tau} e^{-\frac{t}{\tau}}$$

$$\frac{L}{R} \left(\frac{A}{\tau} e^{-\frac{t}{\tau}} \right) + A - A e^{-\frac{t}{\tau}} = E$$

$$A e^{-\frac{t}{\tau}} \left(\frac{L}{R} \frac{1}{\tau} - 1 \right) = E - A \Leftrightarrow \begin{cases} \tau = \frac{L}{R+r} \\ A = E \end{cases}$$

