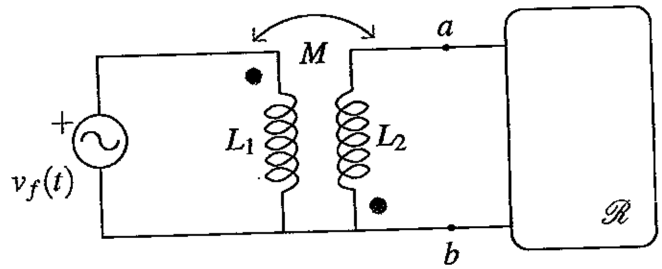
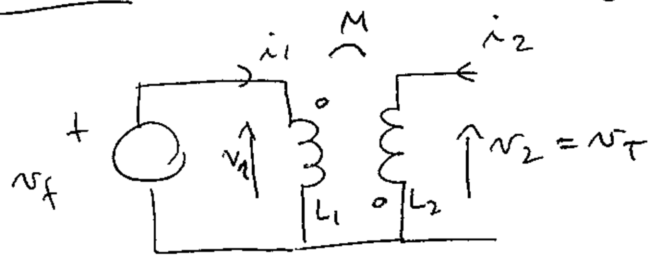
ELO102 – S1 2013 – Control #12 – 16 de agosto de 2013

Problema 12.1 *En la red de la figura, $v_f(t) = A\cos(\omega t)$. Determine la red equivalente Thévenin desde los terminales $a-b$*



$v_T(t)$: | Calculamos el voltaje de circuito abierto



$$v_1 = v_f = L_1 \frac{di_1}{dt} - M \cancel{\frac{di_2}{dt}}^{\,0}$$

$$v_2 = L_2 \underbrace{\cancel{\frac{di_2}{dt}}}_{0} - M \frac{di_1}{dt}$$

$$i_2 = 0$$

Por tanto,

$$v_f = L_1 \frac{di_1}{dt}$$

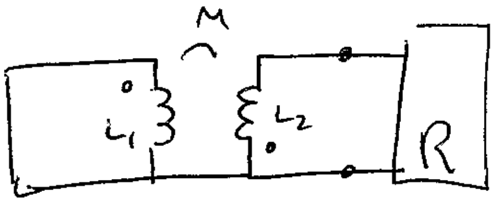
$$v_2 = -M \frac{di_1}{dt}$$

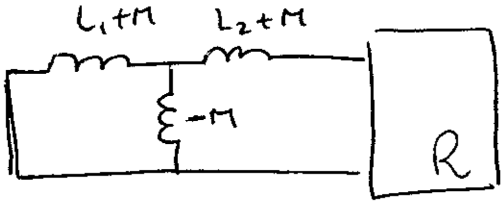
$$v_2 = v_T$$

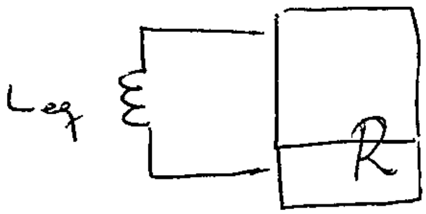
$$\Rightarrow \quad v_2 = v_T = -\frac{M}{L_1} v_f = -\frac{M A}{L_1} \cos(\omega t)$$

Red Relajada:

La red Thévenin se obtiene apagando las fuentes







$$L_{eq} = (L_1+M) // (-M) + L_2 + M$$

$$= \frac{(L_1+M)(-M)}{L_1} + L_2 + M$$

$$= \frac{-\cancel{L_1M} - M^2 + L_1L_2 + \cancel{L_1M}}{L_1} = L_2(1-k^2)$$

en que $k = \frac{M}{\sqrt{L_1L_2}}$

Por tanto, el equivalente Thévenin es: