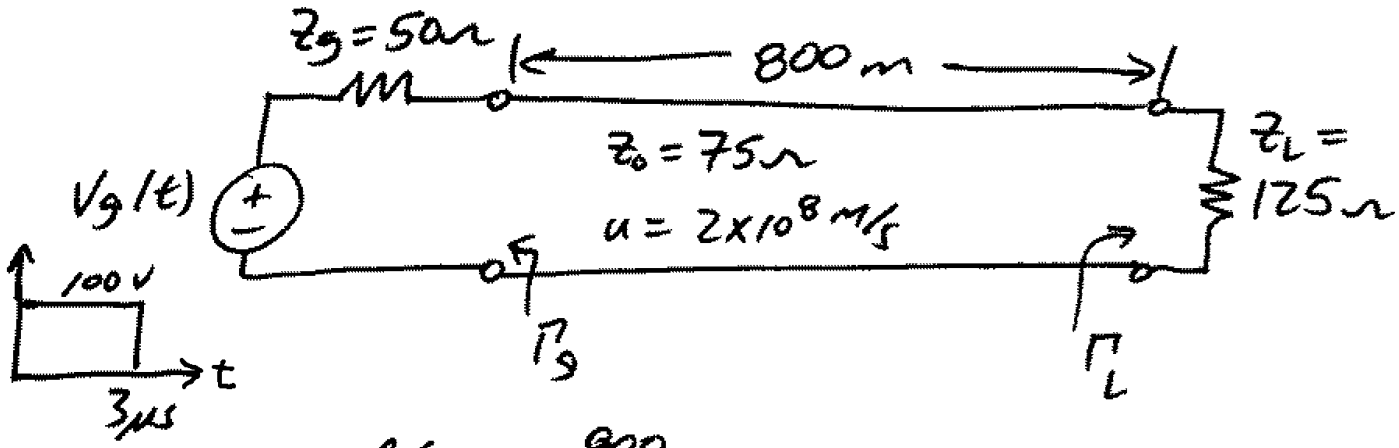
An 800 m long, lossless transmission line ($Z_0 = 75\ \Omega$, $u = 2 \times 10^8$ m/s) is driven by a generator with an open circuit voltage of 100 [$u(t)$- $u(t - 3\ \mu s)$] V and a Thevenin resistance of 50 Ω. It is terminated by a 125 Ω resistive load. Sketch $V(z = 0, 0 < t < 6T)$ and $I(z, t = 2.25T)$.

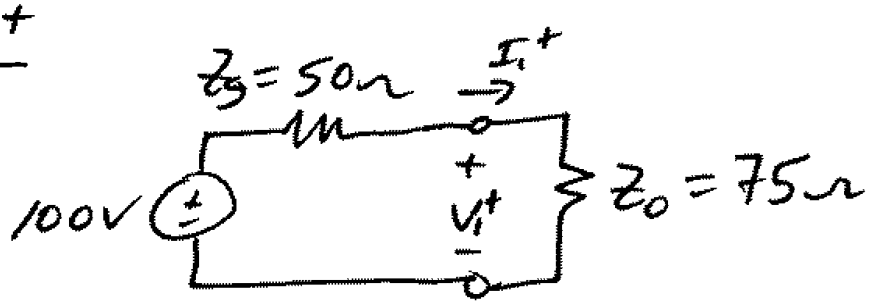


$$T = \ell/u = \frac{800}{2\times10^8} = 4\,\mu s$$

$$\Gamma_L = \frac{Z_L - Z_0}{Z_L + Z_0} = \frac{125-75}{125+75} = 0.25$$

$$\Gamma_g = \frac{Z_g - Z_0}{Z_g + Z_0} = \frac{50-75}{50+75} = -0.2$$

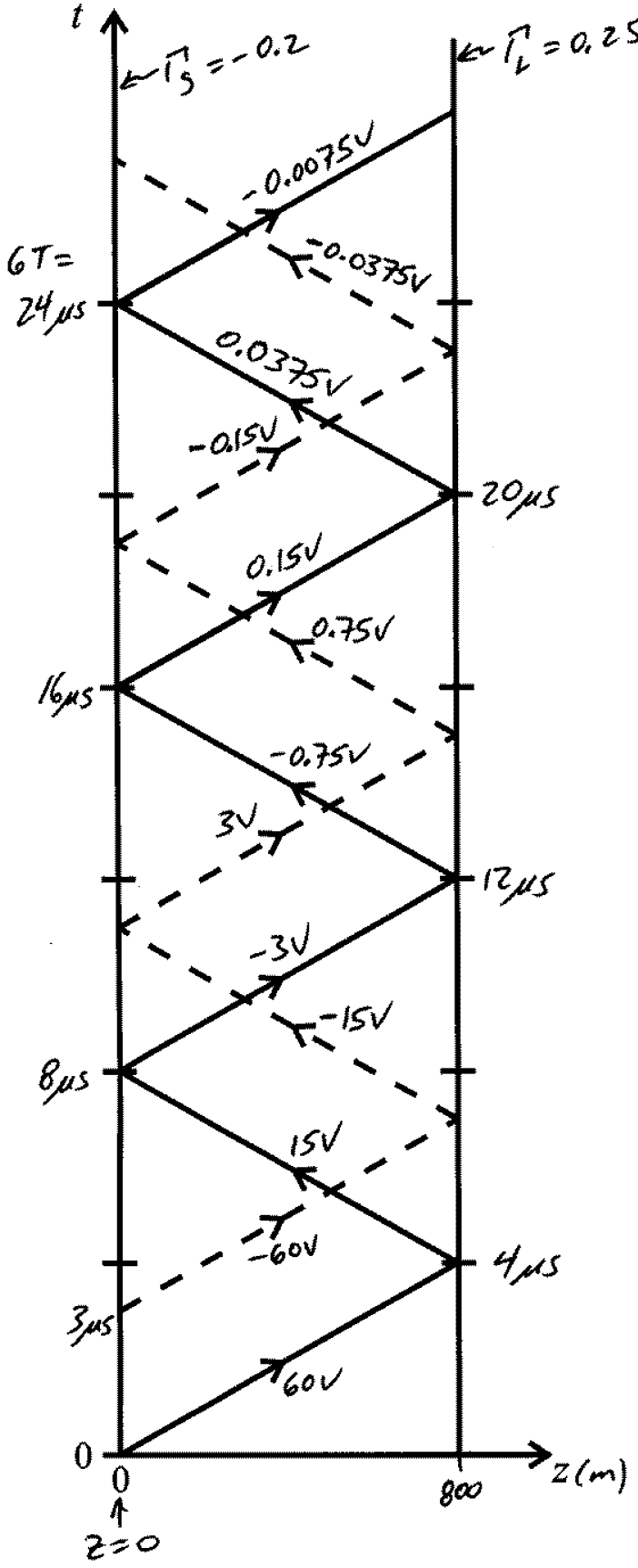
@ $t = 0^+$



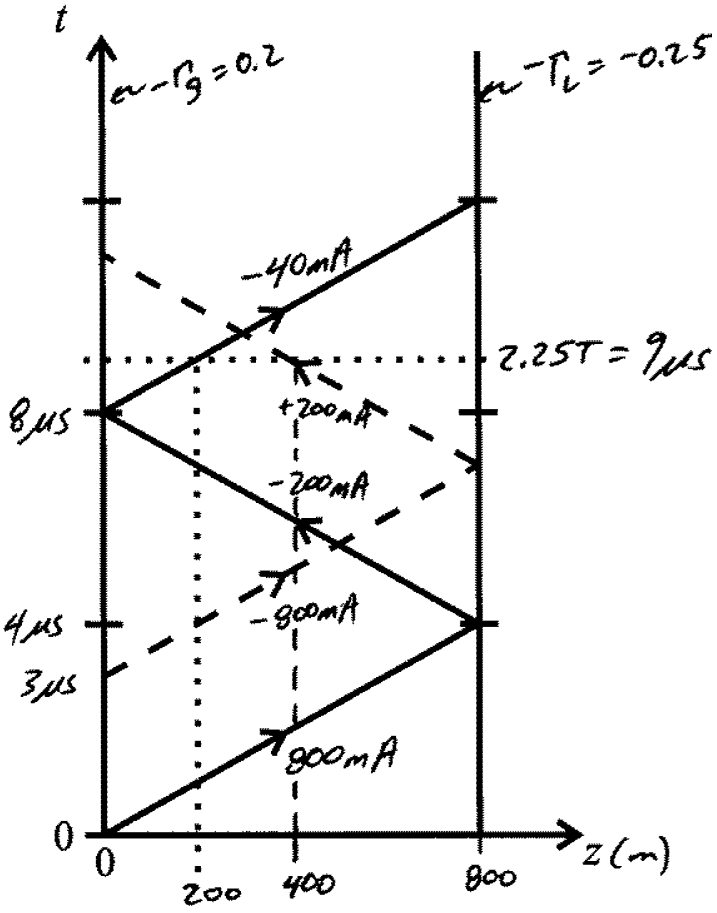
$$V_1^+ = 100\left(\frac{75}{50+75}\right) = 60\,V$$

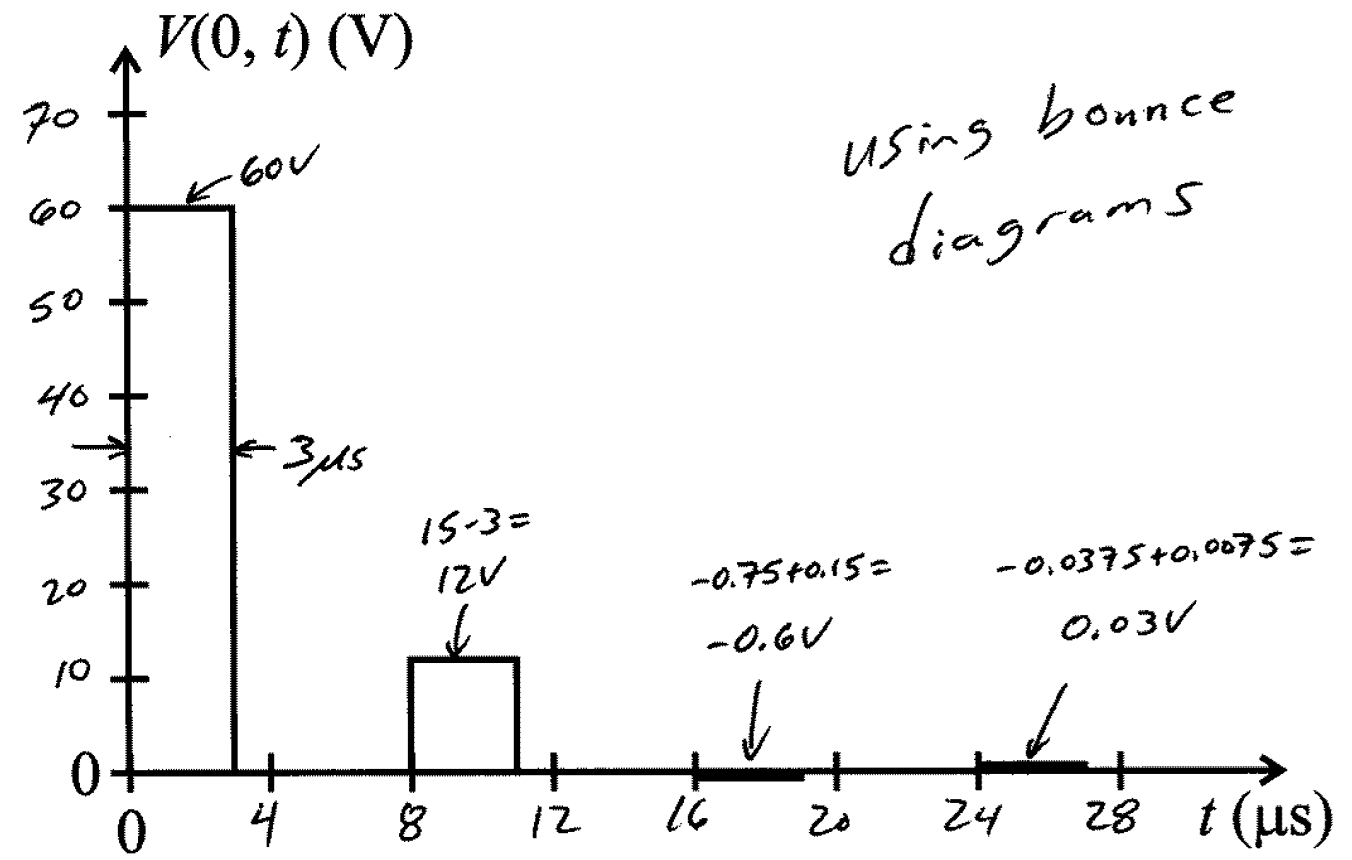
$$I_1^+ = \frac{100}{50+75} = 0.8\,A = 800\,mA$$

Voltage

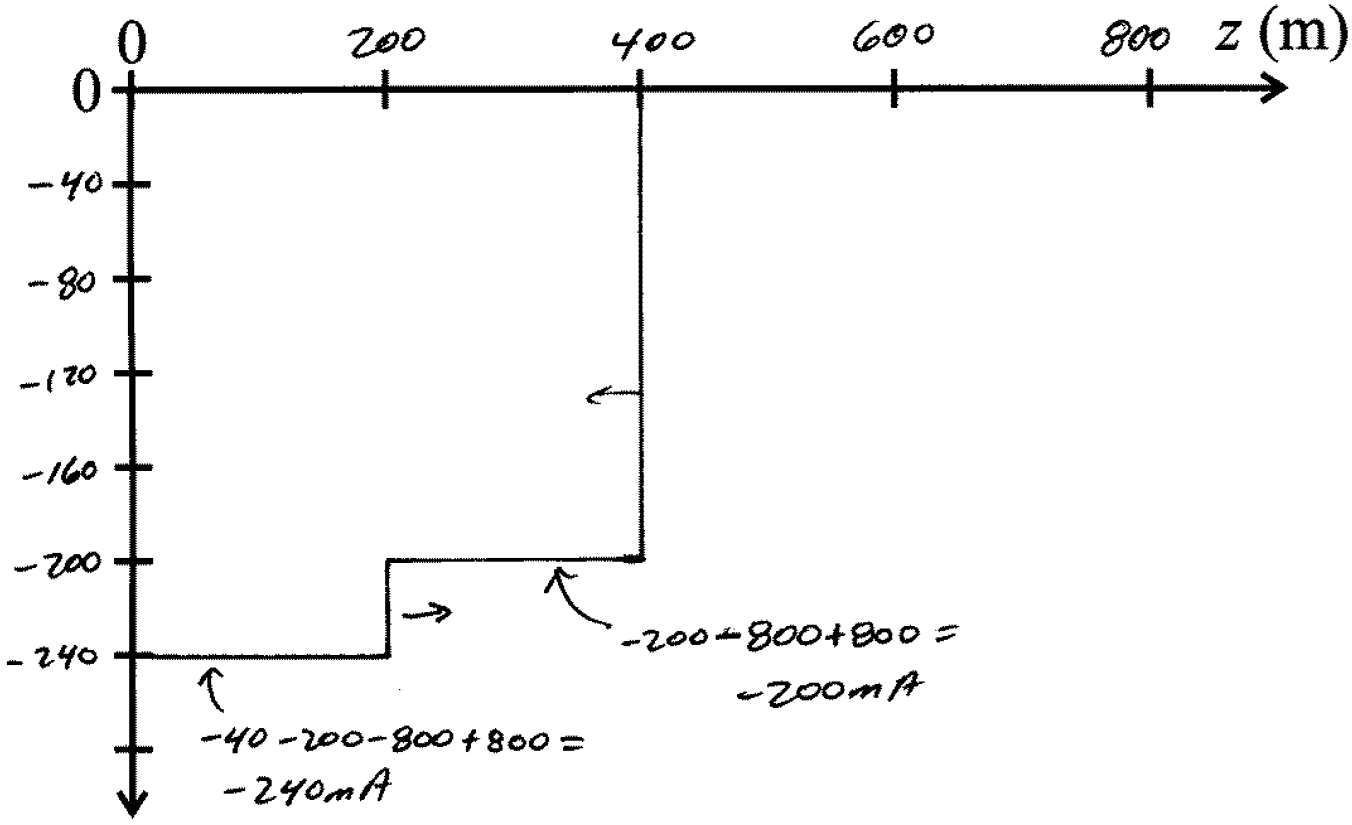


Current





using bounce diagrams



$I(z, t=9\,\mu s)$ (mA)