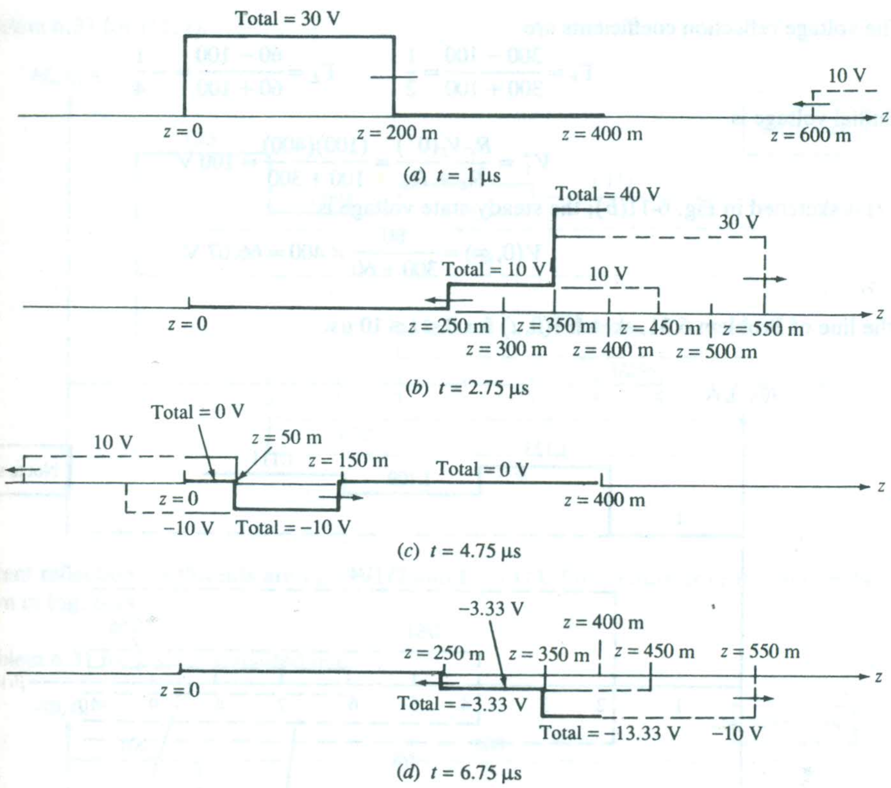

Fig. 6-10

See Fig. 6-10. Note that since the voltage source does not remain constant for $t > 0$ but returns to zero at $t = 1\ \mu s$, the traveling waves are zero along portions of the line. For instance, in the 0.75 μs after the leading edge of the original pulse has reached $z = \zeta = 400$ m, three-quarters of the pulse has "passed through" $z = \zeta$, leaving the trailing edge at $z = 350$ m; during the same time the first reflected pulse has reached $z = 250$ m. The superposition of these two pulses is the two-step distribution shown in Fig. 6-10(b).

A transmission line [Fig. 6-11(a)] has $R_S = 300\ \Omega$, $R_L = 60\ \Omega$, $R_C = 100\ \Omega$, $u = 400\ \text{m}/\mu s$, $\zeta = 400$ m, and $V_s(t) = 400u(t)$ V, where $u(t)$ is the unit step function. Sketch $V(0, t)$ for $0 < t \leq 10\ \mu s$.

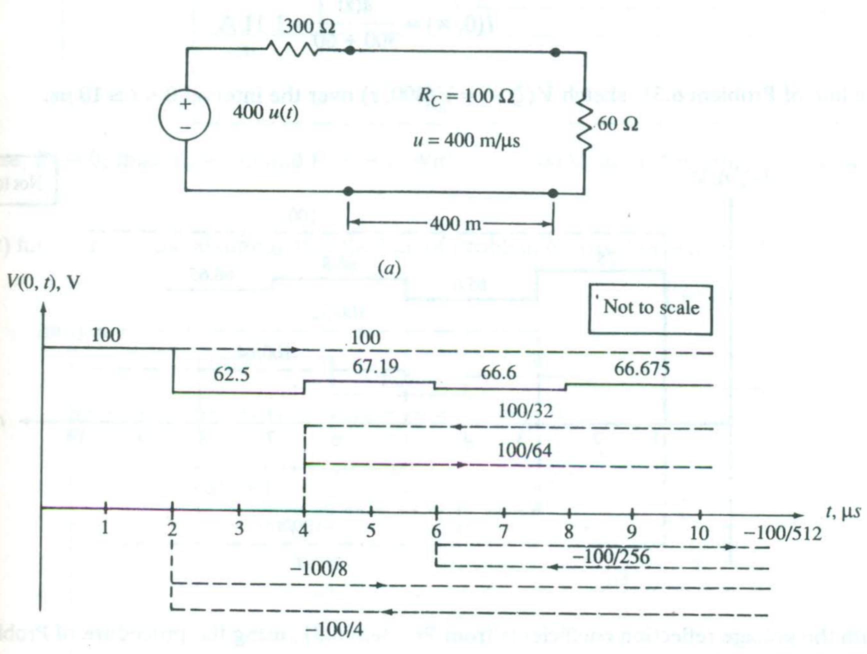

Fig. 6-11

The voltage reflection coefficients are

$$\Gamma_S = \frac{300-100}{300+100} = \frac{1}{2} \qquad \Gamma_L = \frac{60-100}{60+100} = -\frac{1}{4}$$

The initial voltage is

$$V_1^+ = \frac{R_C V_S(0^+)}{R_C + R_S} = \frac{(100)(400)}{100+300} = 100 \text{ V}$$

$V(0, t)$ is sketched in Fig. 6-11(b); the steady-state voltage is

$$V(0, \infty) = \frac{60}{300+60} \times 400 = 66.67 \text{ V}$$

6.32 For the line of Problem 6.31, sketch $I(0, t)$ for $0 < t \le 10\ \mu s$.

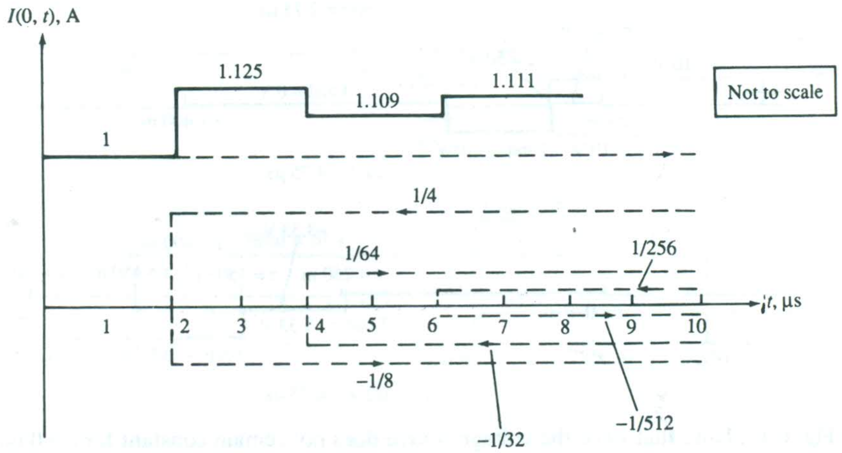

Fig. 6-12

The current reflection coefficients are the negatives of the voltage reflection coefficients (Problem 6.19), and the initial current is

$$I_1^+ = \frac{400}{300+100} = 1 \text{ A}$$

The required $I(0, t)$ is sketched in Fig. 6-12, where the steady-state current is

$$I(0, \infty) = \frac{400}{300+60} = 1.11 \text{ A}$$

6.33 For the line of Problem 6.31, sketch $V(\zeta, t) = V(400, t)$ over the interval $0 < t \le 10\ \mu s$.

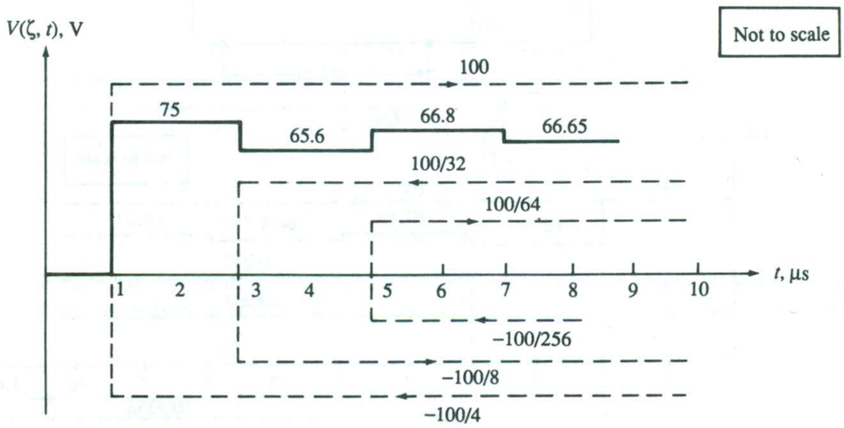

Fig. 6-13

With the voltage reflection coefficients from Problem 6.31, using the procedure of Problem 6.29 we obtain the plot shown in Fig. 6-13.