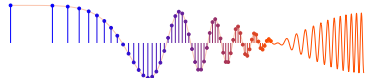
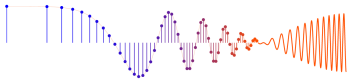


EXERCISE 9.14: Substitute (9.77) into (9.76) and show that all the impulses that result on the right-hand side of the equation cancel except the term $\delta(t)$.

McClellan, Schafer and Yoder, *Signal Processing First*, ISBN 0-13-065562-7.
Prentice Hall, Upper Saddle River, NJ 07458.

SOLUTION



Eq. (9.77) is $h_i(t) = \sum_{k=0}^{\infty} (-\alpha)^k \delta(t - kt_d)$

Eq. (9.76) is $\delta(t) = [\delta(t) + \alpha\delta(t - t_d)] * h_i(t)$

Examine the right hand side of (9.76)

$$\alpha\delta(t-t_d) * h_i(t) = \alpha\delta(t-t_d) * \sum_{k=0}^{\infty} (-\alpha)^k \delta(t-kt_d)$$

$$= \sum_{k=0}^{\infty} (-1)(-\alpha)^{k+1} \delta(t-(k+1)t_d)$$

$$= -\sum_{k=1}^{\infty} (-\alpha)^k \delta(t-kt_d)$$

$\Rightarrow$ RHS becomes

$$\sum_{k=0}^{\infty} (-\alpha)^k \delta(t-kt_d) - \sum_{k=1}^{\infty} (-\alpha)^k \delta(t-kt_d)$$

$$\Rightarrow (-\alpha)^0 \delta(t) = \delta(t)$$