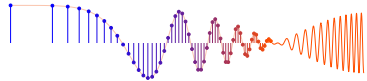


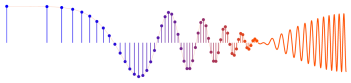
EXERCISE 11.12: Using the delay property and the fact that the Fourier transform of an impulse is the constant 1, show that the impulse response of the echo system is

$$h(t) = \delta(t) + \alpha\delta(t - t_d)$$

Compare your answer to (9.73) on p. 9.73 in Chapter 9.

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

SOLUTION



The frequency response of the echo system is

$$H(j\omega) = 1 + \alpha e^{-j\omega t_d}$$

To get the impulse response we take the inverse Fourier transform

$$1 \longrightarrow \delta(t)$$

$$e^{-j\omega t_d} \longrightarrow \delta(t - t_d)$$

This is the delay property

$$\Rightarrow h(t) = \delta(t) + \alpha\delta(t - t_d)$$