FIGURE 2.1

A "general" stable signal of the form $e^{(\sigma+j\omega)t}$ where $\sigma \leq 0$ indicates a stable waveform for positive time.

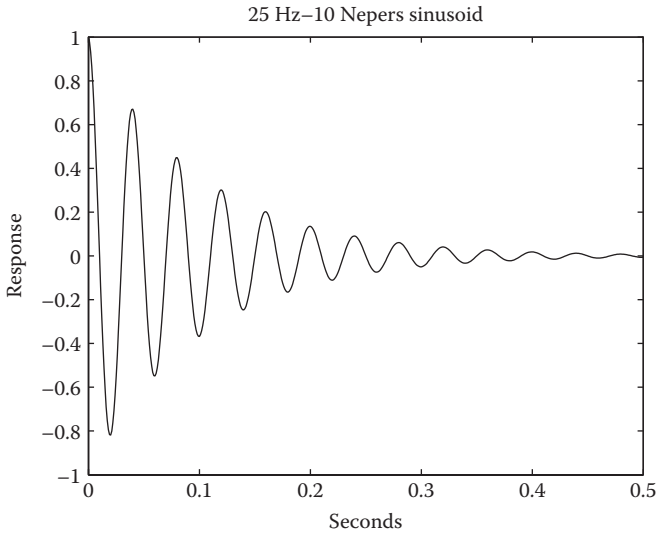

FIGURE 2.2

The region between $\pm\omega_s/2$ (and its images) on the left-hand *s*-plane maps to a region inside the unit circle on the *z*-plane.

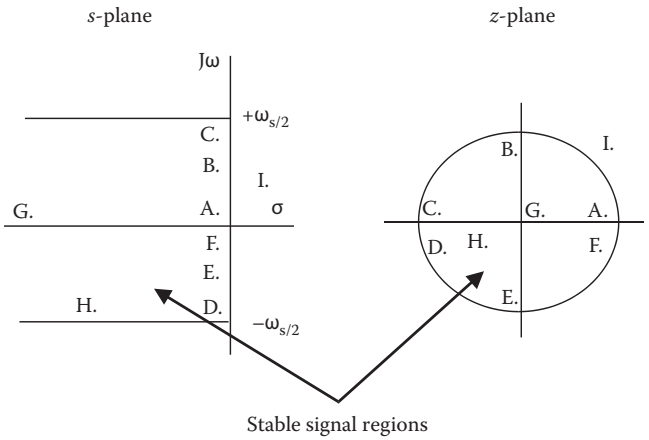

FIGURE 2.3

A mechanical oscillator and its equivalent Laplace transform system model with force input and displacement output.

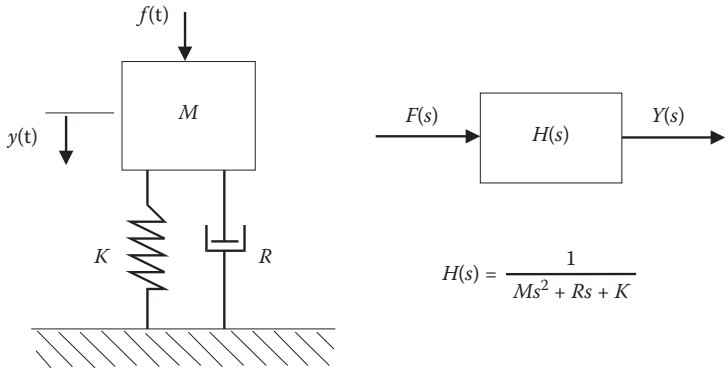

FIGURE 2.4

An unscaled digital impulse response has an amplitude dependence on sample rate.

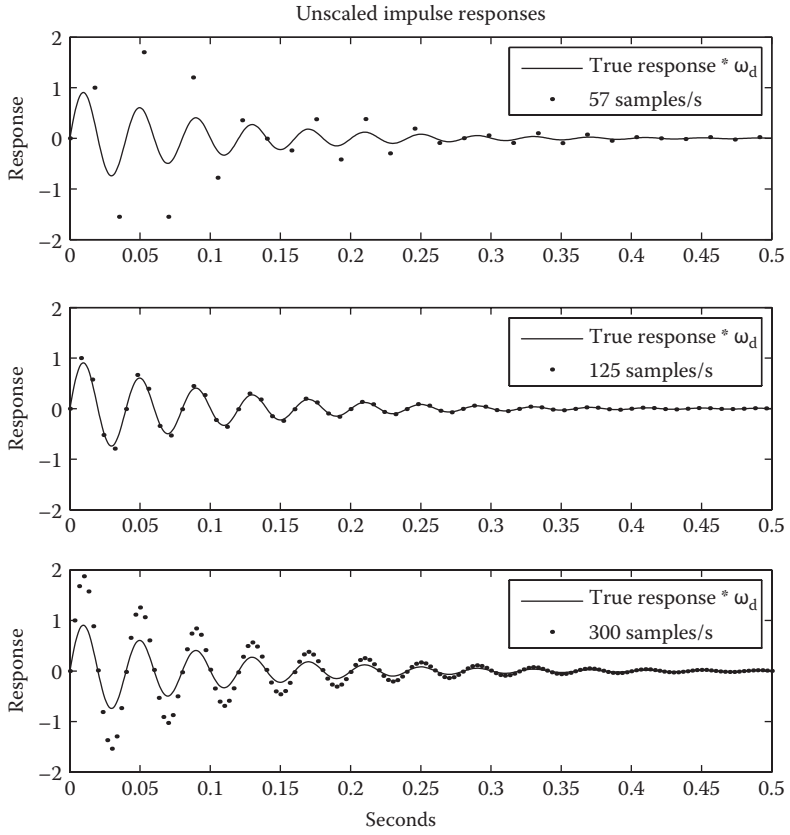

FIGURE 2.5

An accurate impulse response is obtained through proper modal scaling.

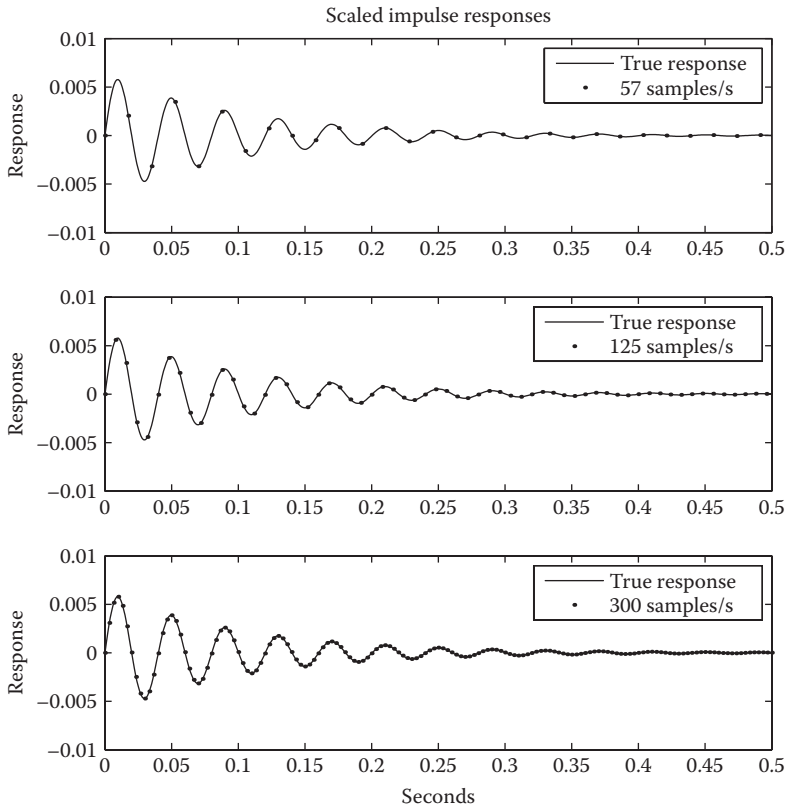

FIGURE 2.6

A comparison of the magnitude and phase of the analog system $H(s)$ and the digital approximation, with scaling $H(z)$ (seen as dots in the plot) shows a good magnitude match at the pole frequency and a slight phase shift due to the digital delay using a sample rate of 300 Hz.

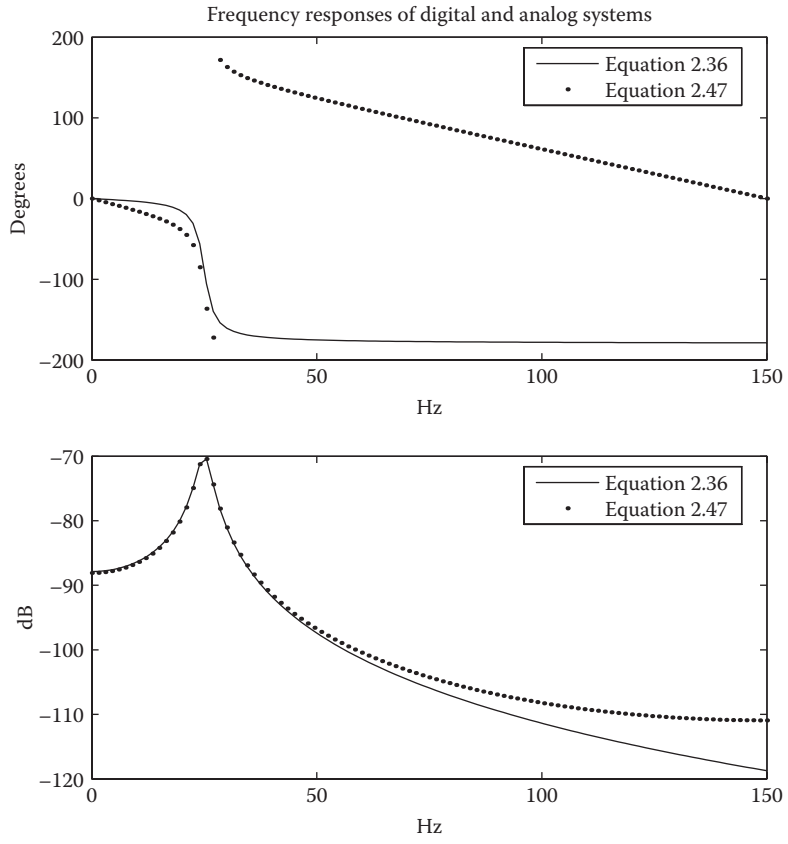

FIGURE 2.7

The same systems shown in Figure 2.6 but with a sampling frequency of 57 Hz showing a good amplitude match at the pole frequency but a much greater phase error due to the delay.

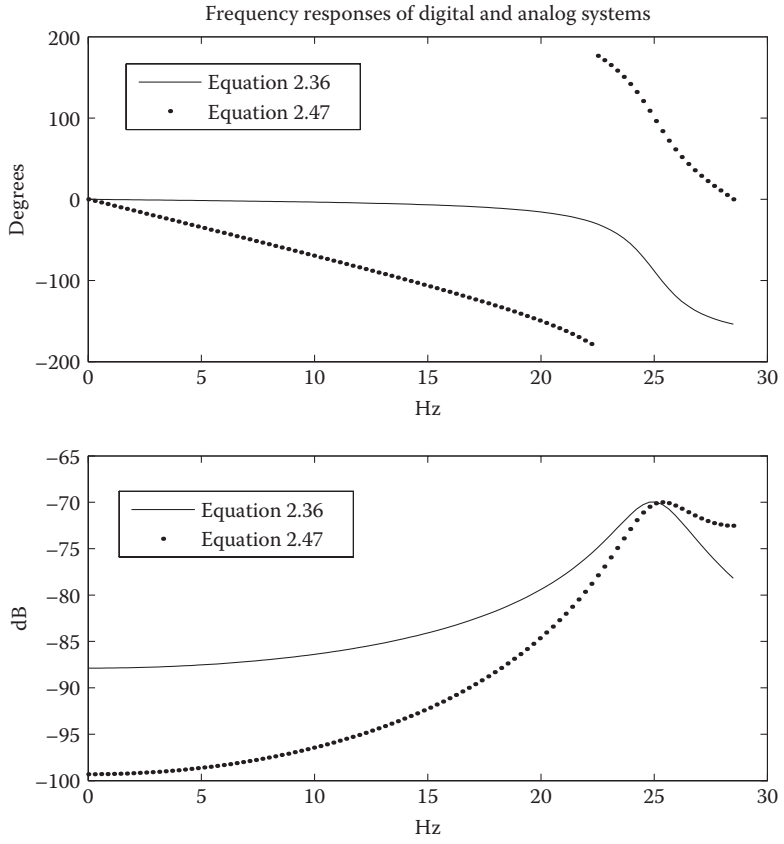

FIGURE 2.8

Comparison of the two-zero, four-pole analog (solid line) impulse response to an approximate linear-scaled (+) and more precise modal-scaled (o) digital impulse response sampled at 600 Hz.

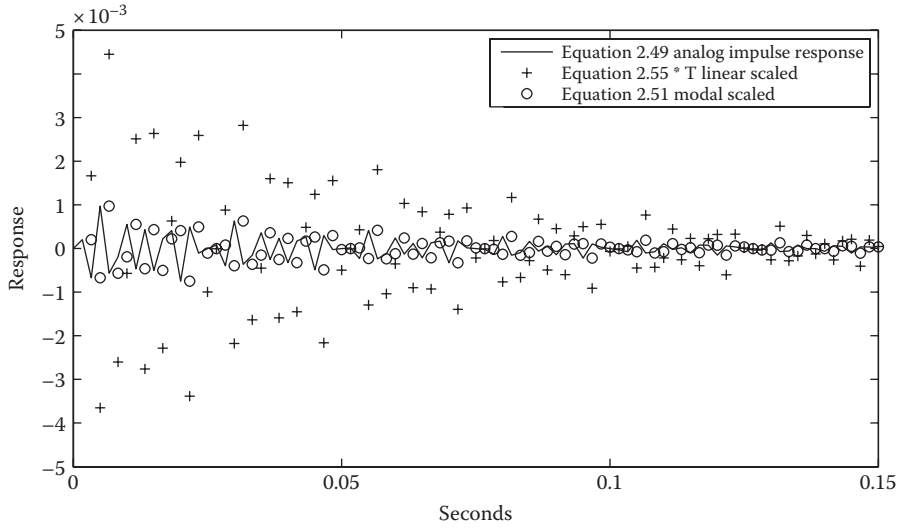

FIGURE 2.9

Comparison of the magnitude frequency response of the system in Figure 2.8.

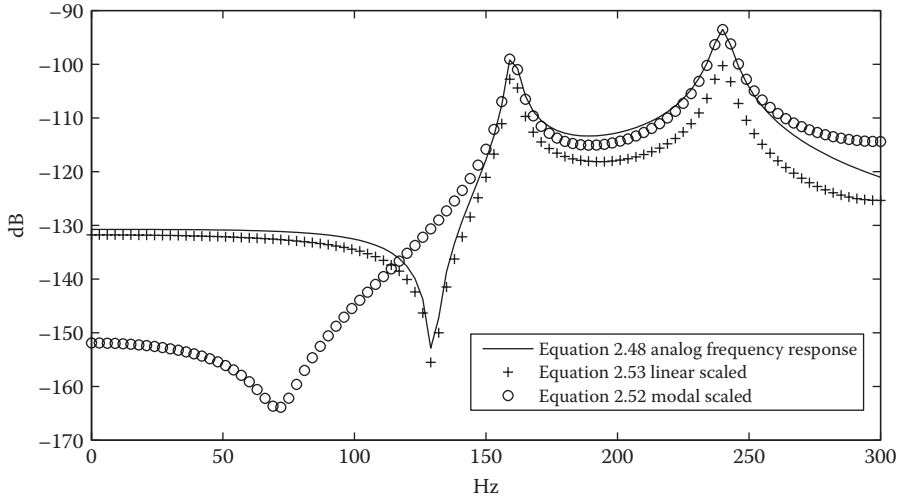

FIGURE 2.10

The impulse response systems in Figure 2.8 using a 3 kHz sample rate.

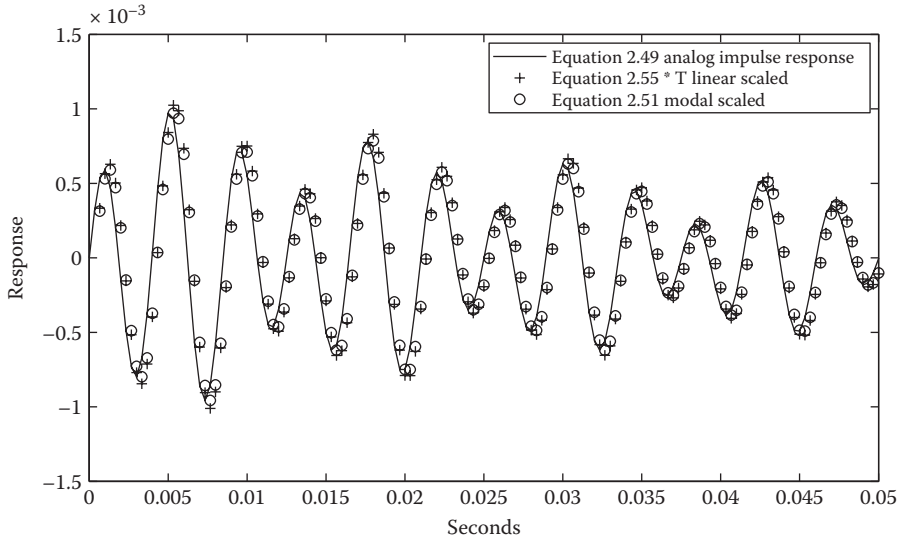

FIGURE 2.11

Comparison of the magnitude frequency response of the system in Figure 2.10 using a 3 kHz sample rate.