

Homework

2
HW

due 2019-02-05, before class

Exams (tentatively)

midterm (tentatively): **Thursday, March 21, 2019, 12:30-13:45**
 final: **Thursday, May 9, 2019**

Solve the following problems from the textbook: 3-19., 3-26., 3-28., 3-35.

3-19. For a lightly damped oscillator, show that $Q \cong \omega_0/\Delta\omega$ (Equation 3.65).

3-26. Figure 3-B illustrates a mass m_1 driven by a sinusoidal force whose frequency is ω . The mass m_1 is attached to a rigid support by a spring of force constant k and slides on a second mass m_2 . The frictional force between m_1 and m_2 is represented by the damping parameter b_1 , and the frictional force between m_2 and the support is represented by b_2 . Construct the electrical analog of this system and calculate the impedance.

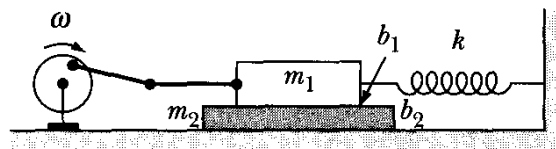


FIGURE 3-B Problem 3-26.

3-28. Obtain the Fourier expansion of the function

$$F(t) = \begin{cases} -1, & -\pi/\omega < t < 0 \\ +1, & 0 < t < \pi/\omega \end{cases}$$

in the interval $-\pi/\omega < t < \pi/\omega$. Take $\omega = 1$ rad/s. In the periodical interval, calculate and plot the sums of the first two terms, the first three terms, and the first four terms to demonstrate the convergence of the series.

3-35. Obtain the response of a linear oscillator to the forcing function

$$\frac{F(t)}{m} = \begin{cases} 0, & t < 0 \\ a \sin \omega t, & 0 < t < \pi/\omega \\ 0, & t > \pi/\omega \end{cases}$$