

3.7-3.8: Mechanical and Electrical Applications

Examples:

A spring is stretched 10cm by a force of 3 N. A mass of 2 kg is hung from the spring and is also attached to a viscous damper that exerts a force of 3N when the velocity of the mass is 0.5 m/s. If the mass is pulled down 5cm below its equilibrium position and given an initial downward velocity of 10 cm/s, find the position u at any time t .

A spring is stretched 6in by a mass that weighs 8 lb. The mass is attached to a dashpot mechanism that has a damping constant of $\frac{1}{4}$ lb·s/ft and is acted on by an external force of $4 \cos(2t)$ lb.

(a) If the mass is pulled 2in below its equilibrium position and released, find the position u at any time t .

(b) Find the steady state of the system (i.e., how does the position behave for large values of t ?).