Review

PHY250 - Fall 2021

Exercise 1

Water flows steadily from an open tank. The elevation of point 1 is H, and the elevation of points 2 and 3 is h. The cross-sectional area at point 2 is A_2 at point 3 it is A_3. The area of the tank is very large compared with the cross-sectional area of the pipe. Assuming that Bernoulli's equation applies, compute (a) the discharge rate and (b) the gauge pressure at point 2.
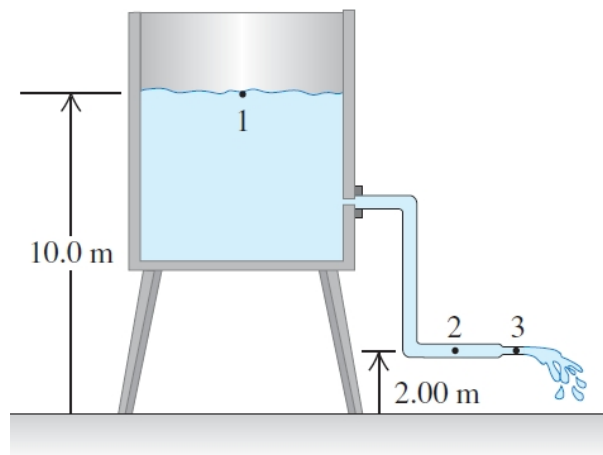

Figure 1: Exercise 1

Exercise 2

A slender, uniform, metal rod with mass M is pivoted without friction about an axis through its midpoint and perpendicular to the rod. A horizontal spring with force constant k is attached to the lower end of the rod, with the other end of the spring attached to a rigid support. If the rod is displaced by a small angle from the vertical and released, show that it moves in angular SHM and calculate the period.
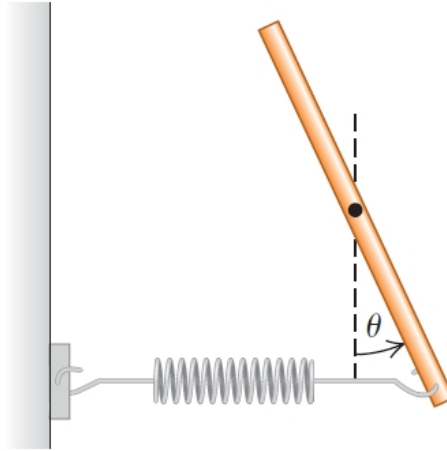
Figure 2: Exercise 2

Exercise 3

A vibrating string 50.0 cm long is under a tension of 1.00 N. The results from five succes-
sive stroboscopic pictures are shown in Fig. 3. The strobe rate is set at 5000 flashes per
minute, and observations reveal that the maximum displacement occurred at flashes 1
and 5 with no other maxima in between. (a) Find the period, frequency, and wavelength
for the traveling waves on this string. (b) In what normal mode (harmonic) is the string
vibrating? (c) What is the speed of the traveling waves on the string? (d) How fast is
point P moving when the string is in (i) position 1 and (ii) position 3? (e) What is the
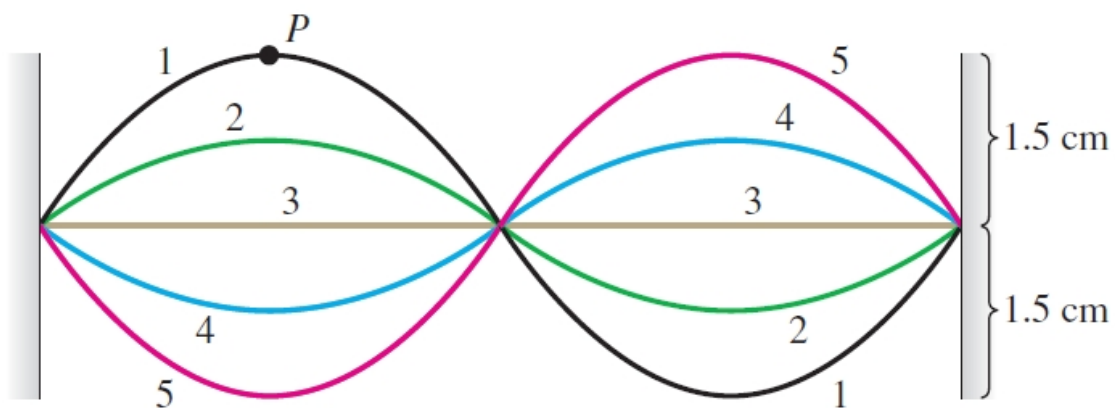mass of this string?

Figure 3: Exercise 3