Keystone: Chapter 4

1) A hanging titanium wire with diameter 2 mm (2×10^{-3} m) is initially 3 m long. When a 5 kg mass is hung from it, the wire stretches an amount 0.4035 mm, and when a 10 kg mass is hung from it, the wire stretches an amount 0.807 mm. A mole of titanium has a mass of 48 grams, and its density is 4.51 grams/cm^3. Find the approximate value of the effective spring stiffness of the interatomic force.

2) What is the sound speed in the wire?

3) If you now swing the 3 m long wire with the 5 kg mass on the end in a circle so that it goes around once every second, how much does the wire stretch?