Answer on Question #64890 – Physics – Other

Question: the speed of sound in the air is c_s . What will be the speed of sound, if the density of air is doubled?

Answer:

The speed of sound in the air c_s can be determined from the following equation:

$$c_s = \sqrt{\frac{\gamma RT}{M}},$$

where γ is the adiabatic constant, R is the universal gas constant, M is the molecular weight of air, and T is the absolute temperature. Thus, we see that the speed of sound depends only on the temperature of air, but not on its density. Therefore, if the density of air is doubled, the speed of sound in air remains the same.