

waves and flow of fluids

1. Wind gusts create wave-ripples on the ocean that have a wavelength of 5 cm and propagate at 2 m/s. What is their frequency?
 2. Provided that the amplitude is high enough, the human ears can detect sound in the range of frequencies from about 20 Hz to about 20 000 Hz. Compute the wavelengths corresponding to the frequencies
 - (a) for waves in air ($v = 343$ m/s);
 - (b) for waves in water ($v = 1480$ m/s).
 3. In a pipeline with varying cross-section, there is a constant volume flow with 5 liters/second. What is the velocity of flow in cases, where the cross-section area is: a) $S_1 = 20$ cm² and b) $S_2 = 100$ cm²?
 4. In a wider part of a pipeline, water is flowing with a velocity 10 cm·s⁻¹. What is the velocity of the water in a narrower part, which has a 2 times smaller radius?
 5. What is the size of a drag force (a hydrodynamic force acting opposite the flow) acting on a sphere with radius $r = 2.5$ cm, when it is positioned in a flow of water with the velocity 1.8 m·s⁻¹ (the drag coefficient for a sphere is $C = 0.48$)
- HW: Mineral oil (density = 0.83 g·cm⁻³) is transported in a pipeline with a circular cross-section ($r = 40$ cm), with a velocity 1.5 m·s⁻¹. Calculate the mass of the oil, transported in 1 hour.