

Physics 290 – Winter 2004

Assignement 8/9

Due April 1, 2004 - NO JOKE

1. Find the speed of sound in the fluid of the inner ear assuming that the density and bulk modulus are that of H_2O .
2. What is the WAVELENGTH of sound of frequency 3000 Hz in the fluid of the inner ear?
3. Find the phase difference that would be measured between two ears for a pure tone of 440 Hz emanated from a speaker 4 meters away from you at an angle of 30° to the right.
4. Describe how this phase difference changes as you turn your head toward the source of the sound.
5. Which of the letter sounds are voiced and which are unvoiced. To answer this question, you should take data using your own vocal apparatus.
6. Find the fraction of sound intensity reflected from the boundary between air and water due to the different impedances of the two media.

Ultrasound with frequency 5 MHz is used to for imaging. Answer the following questions:

7. What is the wavelength of the sound?
8. The ultrasound is directed toward the boundary between the liver and the surrounding aqueous medium. The liver is 10 cm below the surface and is 5 cm thick. Estimate the echo times for the two boundaries between the liver and surrounding medium.

Possible Final Paper Topics

NOTE: Paper topics are due April 1

Relation of basal metabolism to body mass	Artificial bones and joints
CT or PET	Radiation oncology
Radiation exposure risk assessment	Lung diseases
Artificial Hearts, valves, pacemakers	Ultrasound
Regional Cerebral Blood Flow	MRI/fMRI
Cochlear Implants	Localization of sound