

EE480

Self Test: week eleven

1)

A small source of 250 Hz harmonic spherical waves (outwardly propagating) in air is observed from a distance of 4 meters.

a) What is the magnitude and phase of the *specific acoustic impedance* at this location?

b) If the SPL re 20 μPa at this location is 45dB, what is the corresponding particle *speed amplitude* at this location?

c) If the observation point is now moved to 2 meters from the source, what is the percent change in particle speed amplitude between the two locations?

2)

An amplifier with output impedance of 600 Ω is attached to a 600 Ω load. Under these conditions the load power level is measured to be +4 dBm.

If the 600 load is now replaced with a 10 k Ω load, what is the expected load level in dBV?

3)

A room has volume=2000 m³, and total surface area=1000 m². The reverberation time is found to be 2.25 seconds at 125 Hz.

(a) What is the average Sabine absorptivity for the room?

(b) If the average Sabine absorptivity is doubled for 400 m² of the surface area while the remaining 600 m² is left unchanged, what is the expected Sabine T₆₀ after this modification?

4)

A large plane circular piston with radius= 0.5 meters radiates into air (1 atm, 20° C) at a frequency of 4 kHz.

(a) Determine how many far field null angles are present between $\Theta = 0^\circ$ and 90° .

(b) Determine the null angle(s) in degrees.