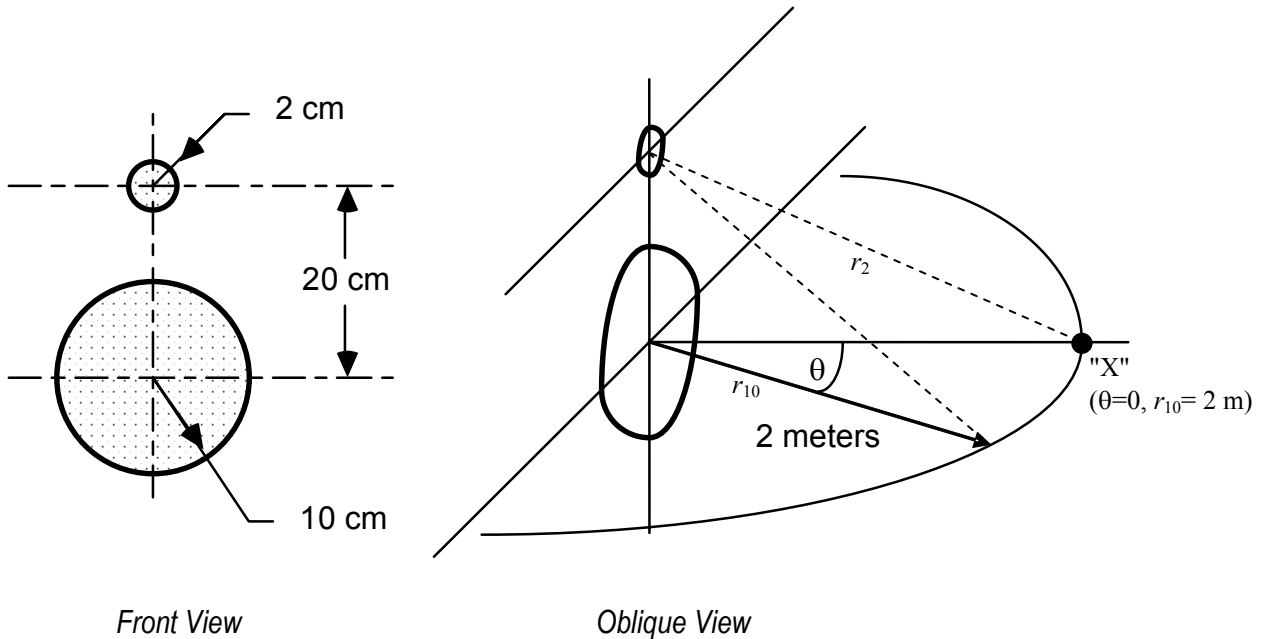


Homework #3

Assigned Friday, October 13, 2006

Due at the start of class on Monday, October 23, 2006

A loudspeaker system with two drivers is described by the following geometry:



Each driver is modeled as a baffled piston radiator (far field case, K&F §7.4b, pp. 181-184). The drivers are operated at $f = 4$ kHz into air at 20°C .

The receiver position "X" is in the plane of the 10 cm radius driver at a distance of 2 meters from the center of that driver. Use the far field pressure relationship (eqn. 7.4.17).

- When the 2 cm radius driver is operated *alone*, the SPL measured for $\theta = 0^\circ$ at "X" is found to be 95 dB re $20\mu\text{Pa}$. When the 10 cm radius driver is operated *alone*, the SPL at "X" is also measured to be 95 dB re $20\mu\text{Pa}$. Determine the speed amplitude (U_0) and the displacement amplitude of each driver.
- Under the same operating conditions, determine and plot the pressure amplitude *in the plane of the 10 cm driver's principal axis* as a function of the angle θ for each of the drivers acting alone. MATLAB would be a useful way to do this. Comment on the results.
- Finally, calculate the far field pressure amplitude as a function of θ when the two drivers operate in phase at the same time. Comment on the results.