

UNIVERSITY OF MIAMI
DEPARTMENT OF ELECTRICAL AND COMPUTER ENGINEERING

ENGINEERING ACOUSTICS

Homework No.3

Submit solutions to the following exercises:

1. For a dipole of size $h = 35$ cm, emitting a broadband signal in free field determine and plot the total far field radiated power and power level at $f = \{250, 500, 1000, 2000\}$ Hz, when the two sources have (a) equal and in phase pressure signals, and (b) equal and 180° out of phase pressure signals. The level of acoustic power emitted by each source is at $L_w = 90$ dB. Also compute the sound pressure and pressure level at 30° elevation and distance of 10 m for both cases (a) and (b).
2. A one dimensional loudspeaker array with length of 1 m, emitting an acoustic signal is observed by a listening point located in the frontal hemisphere of the array at distance of 10 m. Determine the frequency range of operation of the array, which will ensure that the setup meets far field conditions.
3. Only for ECE and graduate students: A one dimensional piston is tapered symmetrically by a velocity profile as shown in the figure below. Determine the expression for the far field pressure function and plot the radiation function $G(u)$, ($u = (1/\lambda)\sin\theta_N$) which results from this arrangement.

