MODAL RESONANCES

CALCULATION OF AXIAL, TANGENTIAL AND OBLIQUE MODES

The frequency of any mode can be obtained from the formula below.

$$frequency = \frac{speed\ of\ sound}{2} * \sqrt{\left(\frac{p}{L}\right)^2 + \left(\frac{q}{W}\right)^2 + \left(\frac{r}{H}\right)^2}$$

Where:

p: 0, 1, 2, 3, … n: [integer]
q: 0, 1, 2, 3, … n: [integer]
r: 0, 1, 2, 3, … n: [integer]

L: Room larger axis
W: Room mid axis
H: Room smaller axis

The different combinations of "p", "q" and "r" provide the frequency of the modes being calculated. For example:

p=1, q=0, r=0 - mode (1,0,0) – axial mode corresponding to the room larger axis.
p=0, q=1, r=0 - mode (0,1,0) – axial mode corresponding to the room mid axis.
p=0, q=0, r=1 - mode (0,0,1) – axial mode corresponding to the room smaller axis.

There are several combinations of integers that can be used for calculations. First modes are associated with values 1. Second modes are associated with values 2. Third modes are associated to values 3, an so on…

These integers not only provide the key to the frequency of a mode, but also serve to identify the mode as axial, tangential or oblique. As a general rule, we can say that when there are two zeros (0,3,0) an axial mode is identified, one zero (2,0,3) identifies a tangential mode and no zeros (1,4,2) identifies an oblique mode.

<u>For calculations in meters</u>

Speed of sound: 344m/s
L (larger axis): [m]
W (mid axis): [m]
H (smaller axis): [m]

<u>For calculations in feet</u>

Speed of sound: 1130ft/s
L (larger axis): [ft]
W (mid axis): [ft]
H (smaller axis): [ft]