EELE 217 Spring 2012

Example of Sabine reverberation time calculation

Consider a rectangular room with floor dimensions 15m x 20m and a ceiling height of 4m.

For this example, let's assume that the floor material has absorptivity $a = 0.2$, ceiling $a = 0.4$, and wall material has $a = 0.6$.

Volume of the room is: L x W x H = 15 x 20 x 4 m^3 = **1200 m^3**

There are six surfaces:

Floor area = 15x20 = 300 m^2
Ceiling area = 15x20 = 300 m^2
Front and back walls = 15x4 = 60 m^2 each
Side walls = 20 x 4 = 80 m^2 each

The Sabine formula is:

$$T_{60} = \frac{0.161V}{\sum_i S_i a_i}$$

V = total volume in m^3
S_i = area of surface i in m^2
a_i = absorptivity of surface i

Thus, the numerator becomes $0.161\ V = 0.161 \times 1200 =$ **193.2**

The denominator is the sum of each surface area times its absorptivity:

Floor: 300 x 0.2 = 60
Ceiling: 300 x 0.4 = 120
Front: 60 x 0.6 = 36
Back: 60 x 0.6 = 36
Side1: 80 x 0.6 = 48
Side2: 80 x 0.6 = 48

Sum in denominator = **348**

So the estimated T_{60} for this example room is 193.2 / 348 = **0.56 seconds**