AUBURN UNIVERSITY
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AEROSPACE

AERO 4970/7970 Fundamentals of Aeroacoustics SET V
Transmission and Variable Area Analysis

1. Plot the transmission loss as a function of frequency between 100 Hz and 10 kHz for the following types of "walls":

   a) A sheet rock and stud wall, $\sigma = 20$ kg/m^2.
   b) A plaster, lath and stud wall, $\sigma = 60$ kg/m^2.
   c) A glass window, $\sigma = 8$ kg/m^2.
   d) A brick and plaster wall, $\sigma = 450$ kg/m^2.
   e) A solid wood door, $\sigma = 35$ kg/m^2.
   f) A hollow core door, $\sigma = 5$ kg/m^2.

2. Calculate the transmission loss of a wall that is 9 m by 2.5 m and is built of brick but contains a closed glass window 0.7 m by 1 m. Use the data given in Problem 1. Assume f = 100, 500, 1k, and 2 kHz. What fraction of the total energy passing through the wall comes through the window? To obtain the transmission loss for this wall calculate the transmission loss for the brick and glass then power coming through each. The total power is then "averaged" over the entire wall and a transmission loss for the composite wall is obtained.

3. Using the data of Problem 1, calculate the transmission loss (for f = 500 Hz) of an interior wall, 8 m by 2.5 m, built of sheet rock and studs, but with a 0.8 m by 2.2 m solid wood door in it. Consider the cases when:

   a) the door is closed.
   b) the door is closed but there is a 0.02 m high gap under it.
   c) the door is open.

4. Using the data of Problem 1, how big of a hole in an 8 m by 2.5 m wall built of sheet rock and studs does it require to transmit as much energy as is transmitted through the rest of the wall? Obtain an equation giving the area as a function of frequency. Calculate the area required at 1000 Hz.